Precision Cooling
For *Business-Critical Continuity™*

# *Liebert® Xtreme Density™*

## *System Design Manual*

EMERSON
Network Power

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# 1.0 SYSTEM DESCRIPTION

The Liebert XD™ family of cooling units delivers efficient, sensible cooling to high-heat environments. Liebert XD systems are designed to cool computer racks and hot zones in a data center or computer room without taking up expensive floor space for cooling components.

The Liebert XD family includes:

- **Liebert XDC**—Liebert XD Chiller; cools and pumps refrigerant to cooling modules
- **Liebert XDP**—Liebert XD Pumping unit; pumps refrigerant to cooling modules
- **Liebert XDA**—mounts on the rear of the equipment cabinet
- **Liebert XDCF**—mounts on the rear of an Egenera BladeFrame EX cabinet
- **Liebert XDH**—Liebert XD Horizontal row cooler; integrated into hot aisle-cool aisle room layout
- **Liebert XDO**—Liebert XD Overhead unit, suspended from the ceiling structure
- **Liebert XDV**—Liebert XD Vertical unit; mounted on top of the equipment cabinet or suspended from the ceiling structure

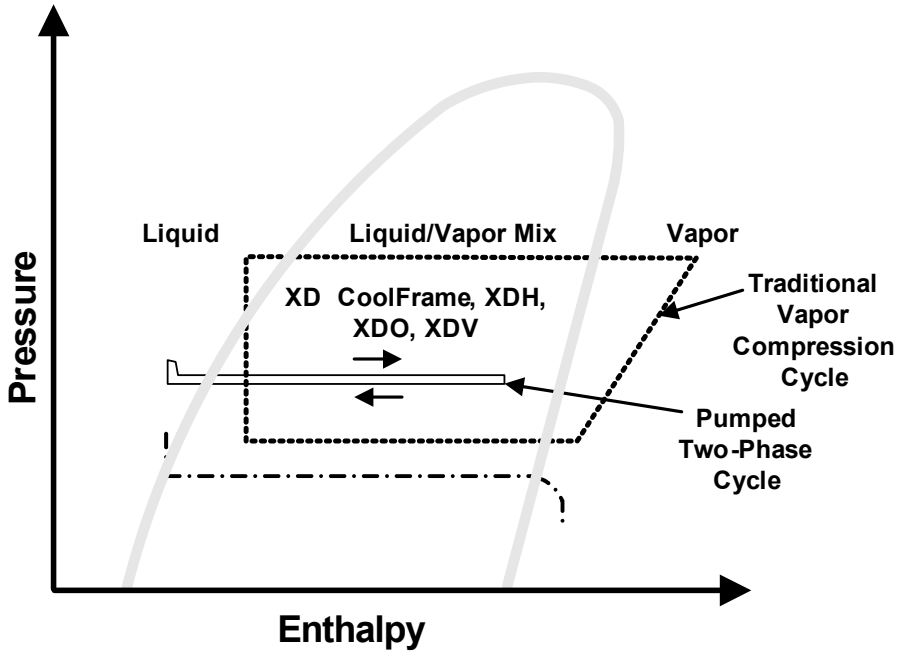
Systems combining Liebert XDO and Liebert XDV units can remove more than 20 kW (5.7 tons) of heat per cabinet. A set of Liebert XDCF modules also can remove 20kW (5.7 tons) of heat from an Egenera BladeFrame EX cabinet. A system with Liebert XDH units can remove more than 30kW (8.5tons) of heat per rack.

For minimum Liebert XDP and Liebert XDC load recommendations, see **1.7.1 - Liebert XDP Minimum Load**; **1.8.1 - Liebert XDC Minimum Load**; and **Tables 27** and **31**.

The Liebert XD system also performs at high efficiency rates. Properly spaced cooling modules and the Liebert XD system's fluid phase change technology, combine to reduce a Liebert XD system's energy consumption to at least 27 percent less than a traditional cooling system.

The Liebert XD family maintains this energy efficiency by employing the heat absorption properties of a liquid (pumped refrigerant) through a phase change. Refrigerant is pumped as a liquid, becomes a gas within the heat exchangers of the cooling modules (either the Liebert XDCF, Liebert XDH, Liebert XDO or Liebert XDV) and then is returned to either the Liebert XDP or Liebert XDC where it condenses to a liquid. This eliminates the compression cycle required by traditional systems. And, if a leak were to occur, the environmentally friendly refrigerant would escape as a gas, causing no harm to critical equipment (see **Figure 1**). Because no compressor is used in the circuit, no oil is needed.

**Figure 1 Pressure enthalpy diagram - refrigerant**



## 1.1 Direct and Indirect System Configurations

Liebert XD systems are available in **Direct** and **Indirect** configurations—differentiated essentially by the method of heat rejection (see **Figures 2** and **3**). The indirect system uses a pumping unit connected to a building chilled water system to control and circulate the refrigerant. In the direct system, the pumping functions are incorporated in the chiller, which must be connected to a separate heat rejection system.

**Figure 2 Direct system configuration—hydraulic system diagram**

**Direct Liebert XD System Configuration**
Pumping and control are performed by chiller.

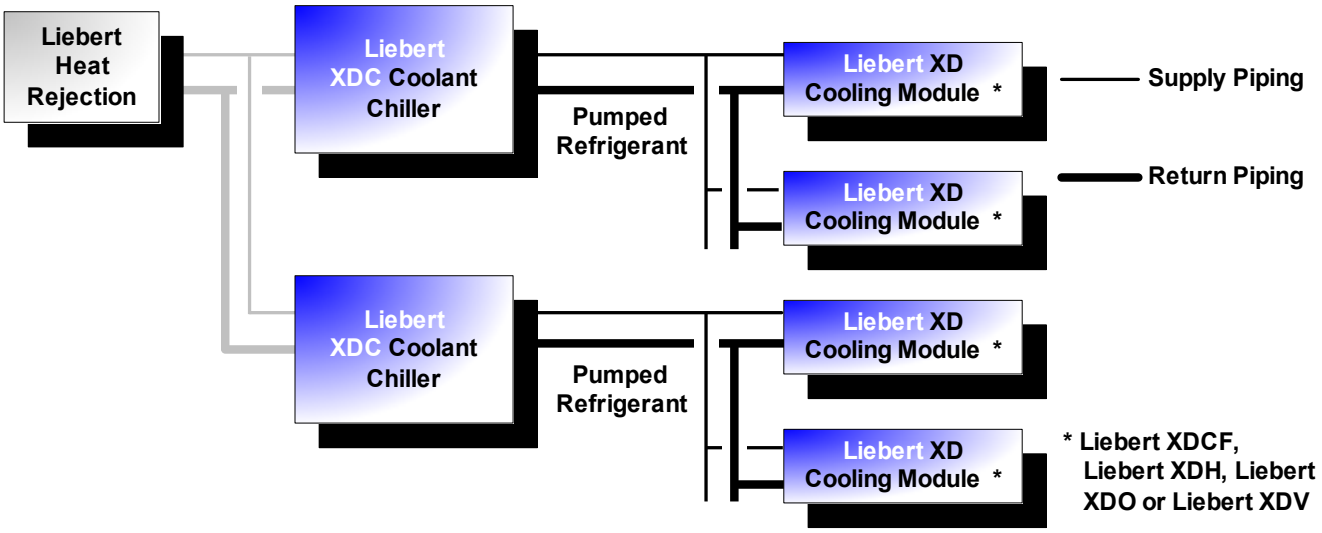
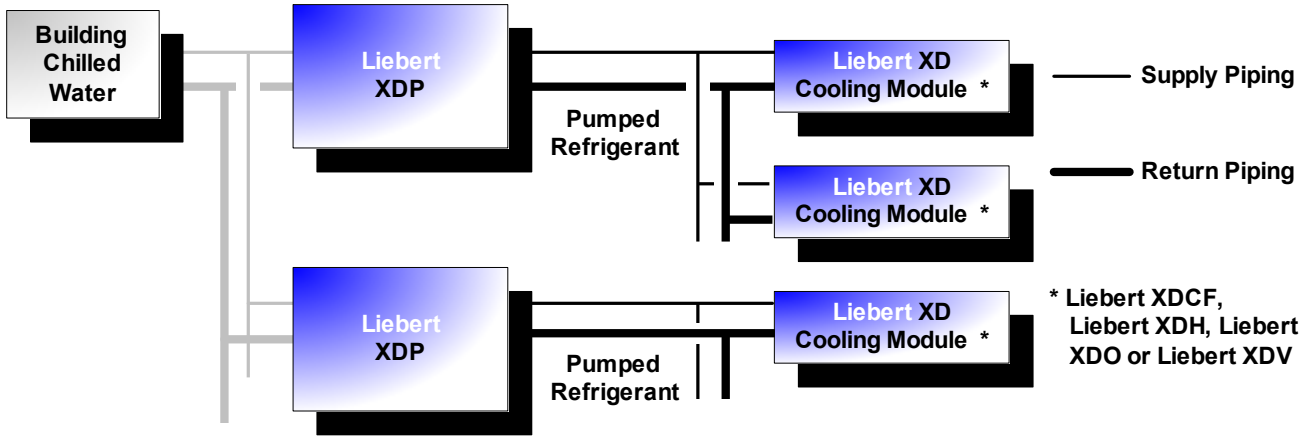

Liebert Heat Rejection
Liebert XDC Coolant Chiller
Pumped Refrigerant
Liebert XD Cooling Module *
Liebert XD Cooling Module *
Supply Piping
Return Piping
Liebert XDC Coolant Chiller
Pumped Refrigerant
Liebert XD Cooling Module *
Liebert XD Cooling Module *
* Liebert XDCF, Liebert XDH, Liebert XDO or Liebert XDV

**Figure 3 Indirect system configuration—hydraulic system diagram**

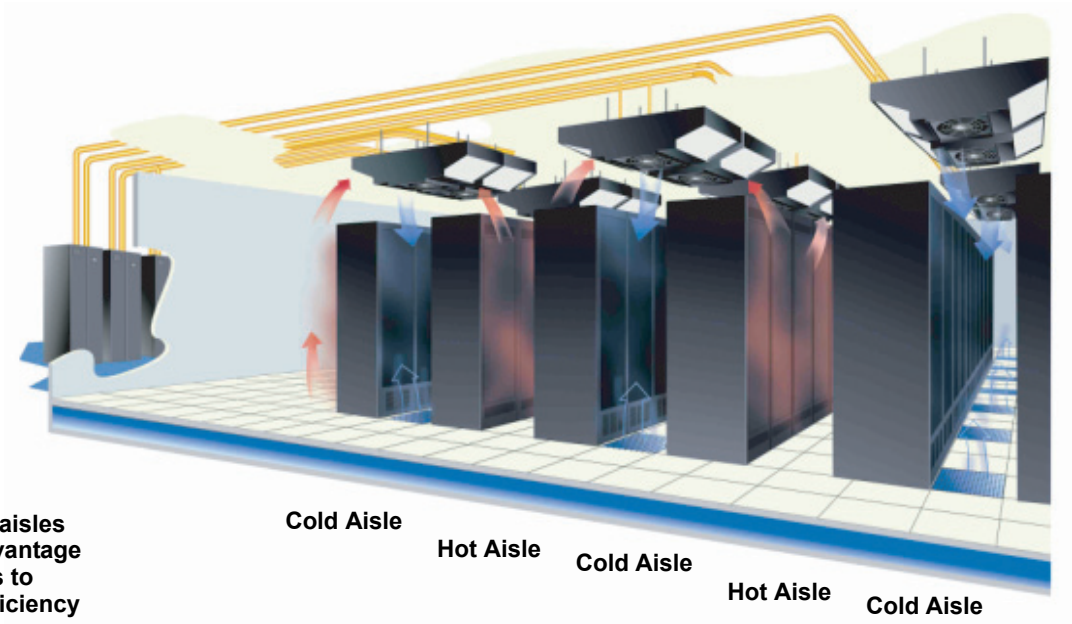
**Indirect Liebert XD System Configuration**
Liebert XDPs pump refrigerant to Liebert XDCF, Liebert XDH, Liebert XDO or Liebert XDV modules, isolate refrigerant circuit from building chilled water supply with an internal heat exchanger and maintains refrigerant temperature above the actual dew point.



## 1.2 Liebert XDO—Overhead Cooling Module

The Liebert XDO ceiling-mounted cooling module draws in hot air rising from densely populated cabinets, passes it over the Liebert XDO's coils and exhausts cooled air downward into the cold aisle.

**Figure 4 Suspended Liebert XDO modules in hot aisle-cold aisle arrangement**




**Hot aisles and cold aisles alternate, taking advantage of airflow properties to increase cooling efficiency**

## 1.3 Liebert XDV—Vertical, Above-Cabinet Cooling Module

The Liebert XDV is installed on top of or above a rack enclosure. It is available with optional flexible metal pipes with automatic shutoff at the ends for easy connection to the refrigerant distribution pipes. The Liebert XDV may be set up in either of two ways:

- The Liebert XDV can take hot air directly from an equipment enclosure, cool the air and discharge it downward into the cold aisle.

  *OR*

- The Liebert XDV can draw hot air from the room, cool the air and discharge the cool air downward into the cold aisle.

**Figure 5 Top-mounted Liebert XDV modules with fixed piping in hot aisle-cold aisle arrangement**

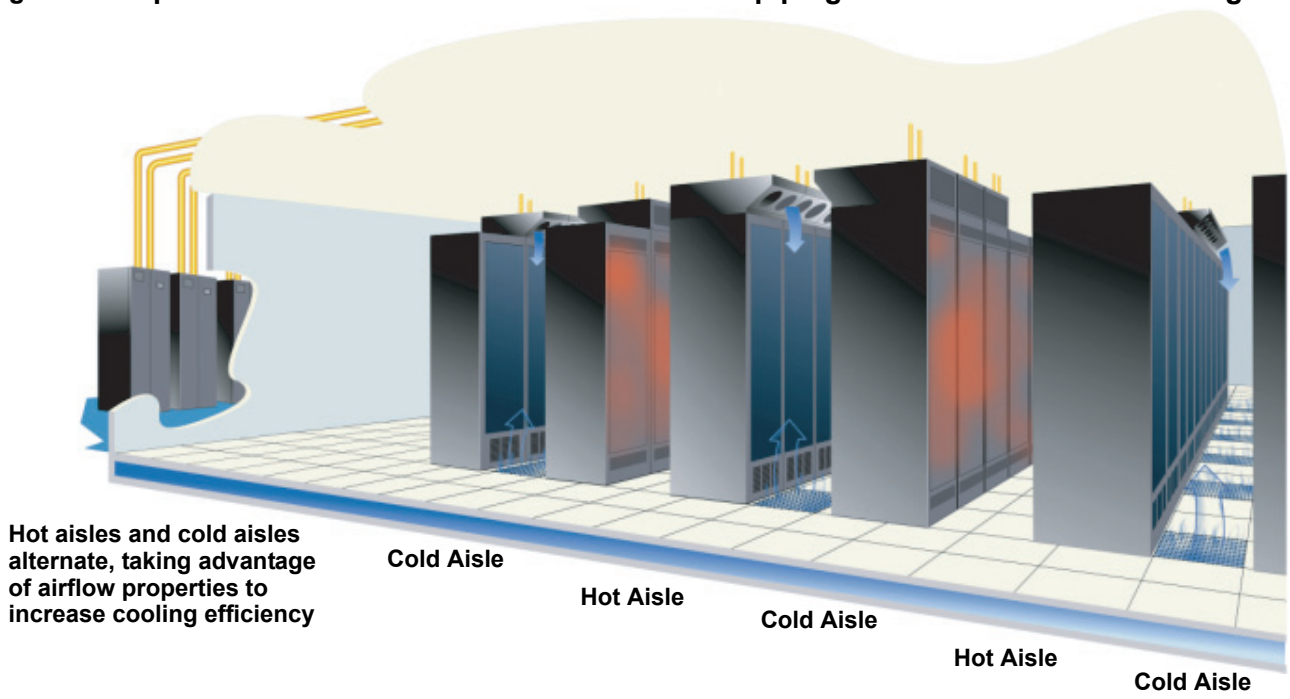
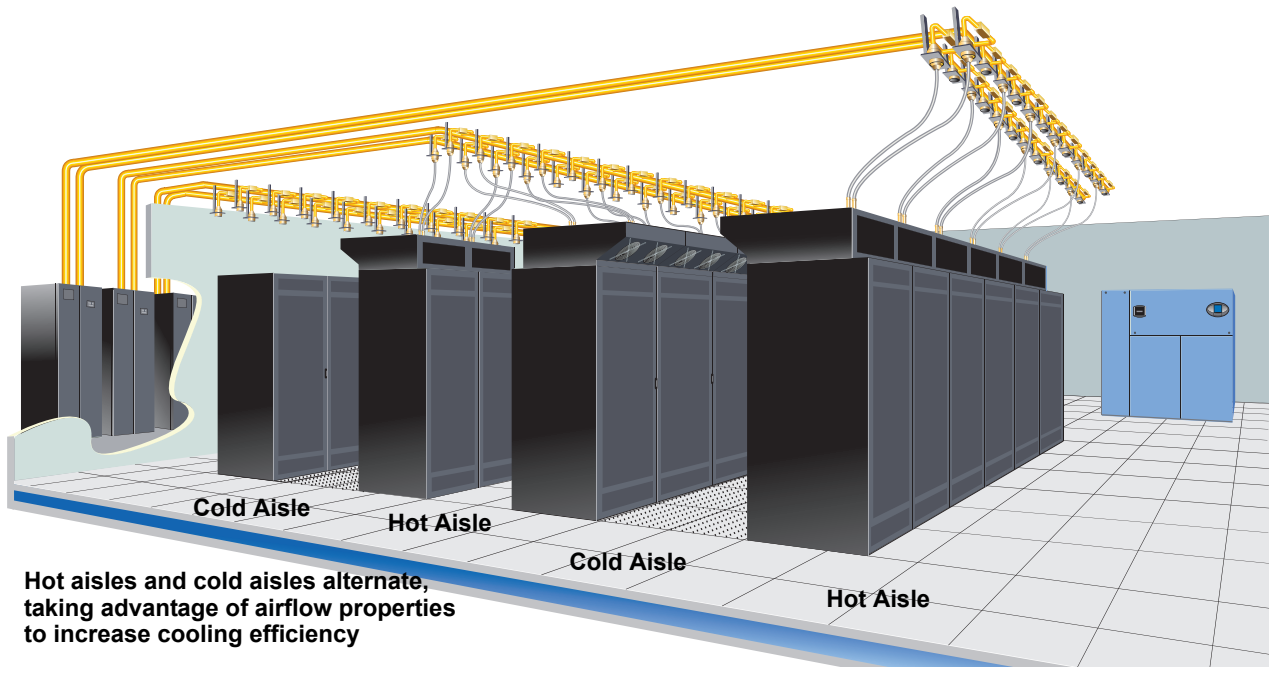

Hot aisles and cold aisles alternate, taking advantage of airflow properties to increase cooling efficiency
Cold Aisle
Hot Aisle
Cold Aisle
Hot Aisle
Cold Aisle

**Figure 6 Top-mounted Liebert XDV modules with flexible piping in hot aisle-cold aisle arrangement**


Cold Aisle
Hot Aisle
Cold Aisle
Hot Aisle
Hot aisles and cold aisles alternate, taking advantage of airflow properties to increase cooling efficiency

## 1.4 Liebert XDH—Horizontal Cooling Module

The Liebert XDH cooling module is designed to be placed within a row of server enclosures in a hot aisle-cold aisle arrangement. The Liebert XDH has dual refrigeration circuits and is available in a half-rack-width unit. The Liebert XDH is intended for use with a Liebert XD pumped refrigerant cooling system, supplied by either a Liebert XDP or Liebert XDC.

**Figure 7 Liebert XDH—horizontal cooling module in hot aisle-cold aisle arrangement**

## 1.5 Liebert XDCF

The Liebert XDCF is a self-contained module designed to cool Egenera's BladeFrame EX cabinets and equipment without exhausting heat into the room. Two modules (top and bottom) may be mounted on the rear of a BladeFrame cabinet. CF modules consist of a sheet-metal frame, coil and filter dryer. It has no moving parts and needs no electricity.

**Figure 8 Liebert XDCF units on BladeFrame EX cabinets**

## 1.6 Liebert XDA—Air Flow Enhancer

The Liebert XDA is a fan unit that boosts the airflow through densely populated enclosures, removing hot spots from within the racks. One or two units can be mounted on the rear of most rack enclosures.

**Figure 9 Liebert XDA—air flow enhancer—on Liebert Foundation enclosure**

## 1.7 Liebert XDP—Pumping Unit

The Liebert XDP isolates the building's chilled water circuit from the pumped refrigerant circuit. The Liebert XDP circulates refrigerant to Liebert XDCF, Liebert XDH, Liebert XDO or Liebert XDV modules while preventing condensation by maintaining the refrigerant's temperature above the dew point. The Liebert XDP employs two sets of remote sensors to determine the temperature and humidity in the air and instantly adjusts refrigerant supply temperature to compensate for changing conditions.

### 1.7.1 Liebert XDP Minimum Load

The Liebert XDP's minimum recommended operating load is 20% of system nominal capacity. For example, a Liebert XDP160 60Hz system's minimum load would be 32 kW. Loading below this value can unfavorably affect system operation. Consult factory for any loading below this recommendation.

**Figure 10 Liebert XDP pumping unit**

## 1.8 Liebert XDC—Refrigerant Chiller

The Liebert XDC is an indoor chiller that connects directly to the Liebert XD cooling modules and provides refrigerant circulation and control. The Liebert XDC keeps the refrigerant temperature above the dew point and eliminates the need for a separate pumping unit in the direct system configuration. The Liebert XDC employs two sets of remote sensors to determine the temperature and humidity in the air and instantly adjusts refrigerant supply temperature to compensate for changing conditions.

### 1.8.1 Liebert XDC Minimum Load

The Liebert XDC's minimum recommended operating load is 40% of system nominal capacity. For example, a Liebert XDC160 60Hz system's minimum load would be 64 kW. Loading below this value can unfavorably affect system operation. Consult factory for any loading below this recommendation.

**Figure 11 Liebert XD Chiller unit**

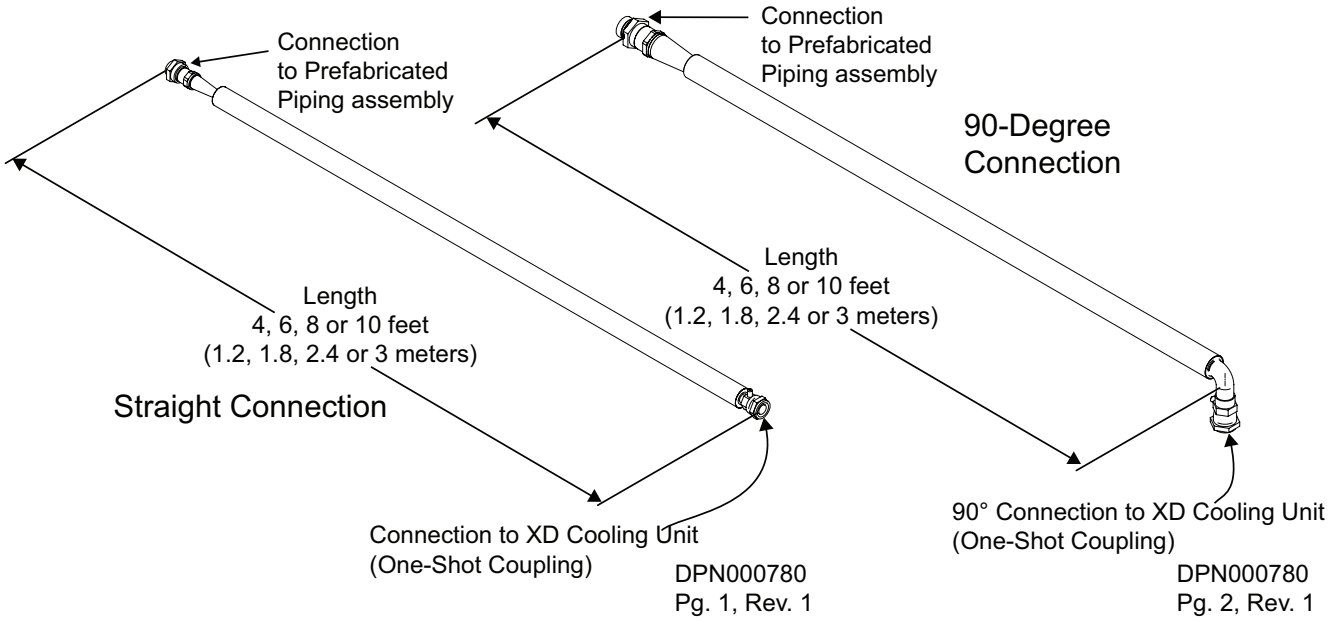
## 1.9 Liebert XD Piping

Liebert XD Piping is prefabricated distribution piping that is installed in anticipation of a growing system. Liebert XD cooling modules are added as required and are quickly made operational with flexible connection piping with threaded couplings. This unique system allows the room cooling capacity to increase to more than 30kW per rack with no additional disruptive piping installation. The flexible connection piping also allows the cooling modules to be re-positioned without interruption in operation.

### 1.9.1 Liebert XD Field Piping

Flex pipe kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8, 2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefabricated piping assembly is a threaded coupler. For information on acquiring the correct kit for your installation refer to DPN000781_Rev1, available from Liebert by calling 1-800-LIEBERT and from your local Liebert representative.

**Figure 12 Liebert XD Flex Pipe dimensions—straight and 90-degree connections**




#### Prefabricated Headers

Field piping kits are available in several versions

- 10 ft. (3.05m) with five or 10 ports
- 8 ft. (2.44m) with two or four ports

Each version is available in two pipe sizes:

- Supply pipe: 1-1/8"; return pipe: 2-1/8"
- Supply pipe: 1-3/8"; return pipe: 2-5/8"

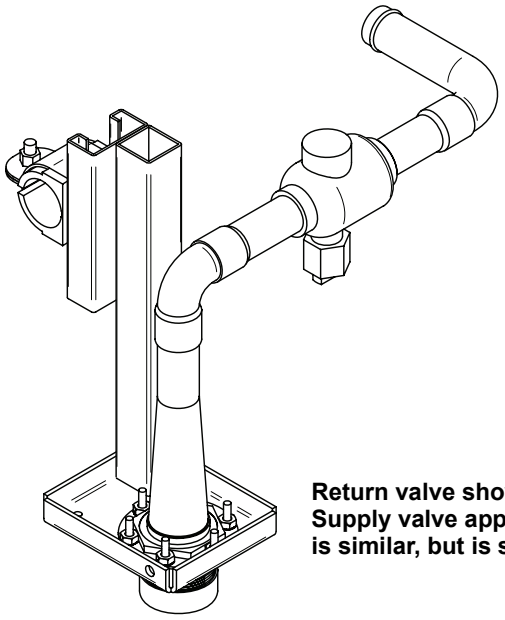
Each kit contains supply pipe(s) and return pipe(s). Each port has a threaded coupling at the end with automatic shutoff when disconnected. Each port also has a ball valve for manual shutoff. For more information refer to section **4.9 - Liebert XD Piping Dimensions and Features**.

#### Liebert XD Connection Port Kit

The connection ports in the Liebert XD Field Piping Kits are available as Liebert XD Connection Port Kit. Each port has a threaded coupling, with automatic shutoff when disconnected, at the end. Each port also has a ball valve for manual shutoff. Each kit contains one supply and one return port. Two kit sizes are available:

- Supply pipe: 1-1/8"; return pipe: 2-1/8"
- Supply pipe: 1-3/8"; return pipe: 2-5/8"

**Figure 13 Liebert XD connection port kit**



**Return valve shown**
**Supply valve appearance is similar, but is smaller**

**Table 1 Liebert XD field-installed port kits header connection size**

| Assembly P# | Supply Header Diameter | Return Header Diameter |
|---|---|---|
| 183169G3 | 1-1/8” | 2-1/8” |
| 183169G4 | 1-3/8” | 2-5/8” |

# 2.0 STARTING A NEW EQUIPMENT COOLING PROJECT

## 2.1 Determining Cooling Equipment Needs

1. Is adequate space available for a Liebert XD installation?
2. Is the hot aisle/cold aisle approach being utilized for this room design or can it be utilized in this room design?
3. Is redundant cooling equipment required?
4. Are there access considerations for all components (possible rigging problems)
5. What heat load growth is anticipated over the next few years?
6. How are the cabinets going to be populated (density of heat generation)?
7. What monitoring requirements are desired or needed?
8. Who will be involved in this project (stakeholders)?
9. Is there existing computer room environmental cooling systems for humidity control and filtration?
10. Is the vapor barrier sufficient?
11. Is a chilled water system available?
    a. What is the system's capacity?
    b. What is the system's chilled water supply temperature?
    c. Does the chilled water supply temperature vary during the year or is the temperature constant?
12. How much power is available for cooling equipment?
13. What is the maximum distance between the Liebert XDP/Liebert XDC unit and the farthest Liebert XD cooling module in the proposed layout?
14. If an air cooled Liebert XDC is used – is an area available for the remote condenser?

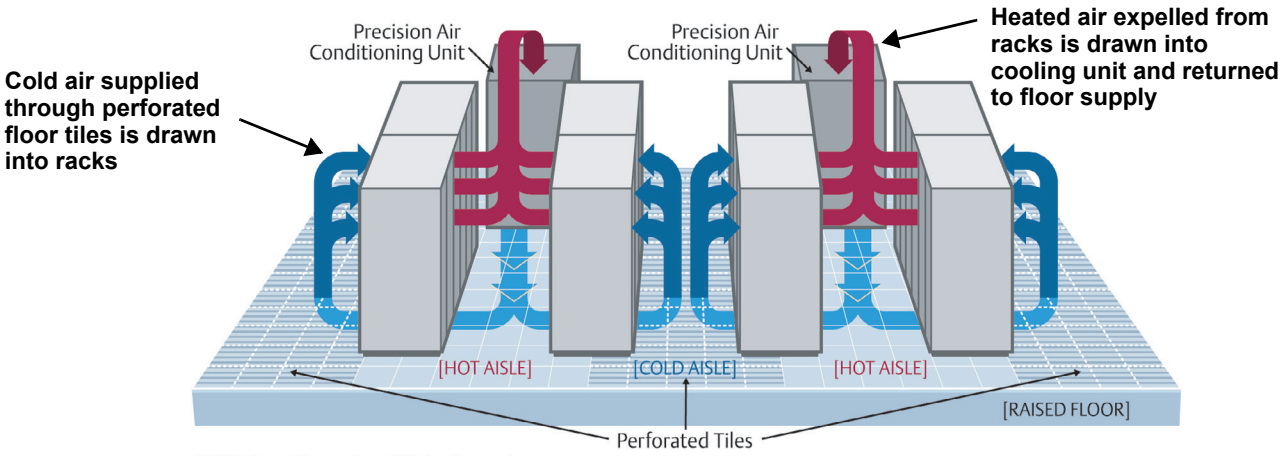
## 2.2 Implementing a Hot-Aisle/Cold Aisle Design

A best practice is to use rows of equipment racks in an alternating arrangement of cold aisles and hot aisles. This is best accomplished when the layout of the file-server farm area is first being planned, and it is exceedingly more difficult to accomplish when the computer room is already populated with operating hardware.

In the cold aisle, the equipment racks are arranged face to face so the cooling air discharged up through the perforated floor tiles is drawn into the face of the computer hardware and exhausted out the back of the equipment rack onto the adjacent hot aisles.

Hot aisles are literally hot because the objective of the alternating cold and hot aisle design is to separate the source of cooling air from hot air discharge which returns to the computer-room cooling unit. Therefore, no perforated tiles should be placed in the hot aisles. as this would mix hot and cold air and thereby lower the temperature of the air returning to the cooling units, which reduces their usable capacity.

**Figure 14 Hot aisle-cold aisle arrangement with under-floor source**


Cold air supplied through perforated floor tiles is drawn into racks
Precision Air Conditioning Unit
Precision Air Conditioning Unit
Heated air expelled from racks is drawn into cooling unit and returned to floor supply
[HOT AISLE]
[COLD AISLE]
[HOT AISLE]
[RAISED FLOOR]
Perforated Tiles

# 3.0 DESIGNING A LIEBERT XD SOLUTION

Liebert XD systems are intended for use with precision air conditioning equipment, such as the Liebert Deluxe System/3 and Liebert DS. The precision air conditioning equipment is required to control the room's humidity and to filter the air.

The Liebert XD systems provide efficient, highly effective heat removal (sensible cooling only), and provide no dehumidification. The Liebert XD control system maintains the refrigerant temperature just above the dew point of the space to prevent condensation. Since the capacity of the system is limited by the dew point in the space, sufficient dehumidification and an adequate vapor barrier must be provided to maintain the dew point at or below the level necessary to achieve the required capacity.

The Liebert XD system is optimized for hot aisle/cold aisle equipment configurations, the industry's most highly recommended method for dealing with extremely high heat loads.

Refer to the technical data manual of either the Deluxe System/3 (SL-18100) or the Liebert DS (SL-18810) for additional installation and application guidelines that apply to all critical space cooling applications.

## 3.1 Determine Cooling Requirements and Select Liebert XD System

1. Calculate the total cooling required
2. Determine placement of the Liebert XD units
3. Determine required pipe sizes
4. Calculate the refrigerant volume of the Liebert XD systems
5. Complete design details including, electrical, mounting, piping, etc.

## 3.2 Calculate the Heat Load to be Handled by Liebert XD System

When designing a cooling solution using the Liebert XD system, the initial steps are similar to those required to cool a conventional critical space. The total heat load must be calculated, including sensible and latent cooling requirements. These should be increased by the reserve capacity needed for pull-down situations where the room temperature must be reduced and to provide for unexpected increases in heat load.

**NOTE**

*Reserve capacity is distinct from redundant capacity in that redundant capacity may or may not be available concurrently with normal operating capacity. Reserve capacity is available concurrently with normal operating capacity.*

The next step is to determine how much of the required cooling capacity is to be provided by Liebert Deluxe or Liebert DS units. If the facility is new, typically up to 150 watts per square foot (1500W/$m^2$) of cooling can be obtained from Liebert precision air conditioning units supplying air through a raised floor. In existing facilities, such factors as raised floor height, under-floor obstructions or other limitations may reduce this to less than 50 watts per square foot (500 watts per $m^2$).

Once the total required sensible cooling capacity is known, subtract the sensible cooling portion to be provided by Liebert Deluxe or Liebert DS units. This yields the cooling capacity to be provided by the Liebert XD system.

## 3.3 Selecting Liebert XD Cooling Modules

The next step is to select the Liebert XD cooling modules to be configured into the solution. Liebert XD modules that use pumped refrigerant can be connected to the same Liebert XDP/Liebert XDC piping circuit. This includes the Liebert XDCF, Liebert XDH, Liebert XDO and Liebert XDV.

Generally, the Liebert XDO is selected for use in new installations or renovations where the unit can be installed on the ceiling or in the overhead space.

The Liebert XDV is designed to permit mounting directly on top of an equipment cabinet, for ease of installation in existing facilities. The Liebert XDV may also be suspended from overhead, using suitable mounting methods.

The Liebert XDCF is a self-contained module designed to cool Egenera's BladeFrame EX cabinets and equipment without exhausting heat into the room. Two modules may be mounted on the rear of a BladeFrame cabinet.

The Liebert XDH is installed among equipment cabinets and is particularly suited to new installations.

## 3.4 Airflow Requirements for Liebert XD Solutions

Computer manufacturers typically specify a temperature change from intake to exhaust (delta T) of 18-27°F (10-15°C) for the air passing through a rack enclosure. The heat generated by electronic equipment combined with the tight quarters of equipment cabinets mean that high volumes of air must move through an enclosure to meet this cooling specification.

A Liebert XD system can supply the cooled air to satisfy this cooling demand, but airflow through the enclosure must be adequate to extract the heat from the cabinet. Liebert's XDA units can boost the airflow to levels necessary to protect critical equipment. The Liebert XDA is particularly suited to the hot aisle/cold aisle arrangement.

## 3.5 Configuring a Liebert XD System

### 3.5.1 Number of Modules Supported by a Liebert XDP or Liebert XDC

The numerals designating the model size of a Liebert XD unit may be used to configure a cooling system. For example, a Liebert XDO20 has a model size of 20 and a Liebert XDP160 will accommodate cooling modules with a cumulative model size of 160.

Similarly, the minimum number of modules connected to a Liebert XDP or Liebert XDC may be calculated using the model size number for the Liebert XDP or Liebert XDC and the modules. See **Table 2**.

**Table 2 Maximum and minimum modules supported by a Liebert XDP or Liebert XDC**

| Cooling Module Type | Liebert XDC | | Liebert XDP | |
|---|---|---|---|---|
| | Max | Min | Max | Min |
| Liebert XDCF | 16 | 6 | 16 | 4 |
| Liebert XDH20 | 8 | 4 | 8 | 2 |
| Liebert XDH32 | 5 | 2 | 5 | 1 |
| Liebert XDO16 | 10 | 4 | 10 | 2 |
| Liebert XDO20 | 8 | 4 | 8 | 2 |
| Liebert XDV8 | 20 | 8 | 20 | 4 |
| Liebert XDV10 | 16 | 7 | 16 | 4 |

Different types of Liebert XD cooling modules may be connected to the same Liebert XDP or Liebert XDC as long as the sum of their cooling capacity does not exceed the supporting Liebert XDP's or Liebert XDC's model size number.

**NOTE**

*Connecting only Liebert XDCF modules to a Liebert XD unit is not recommended because the Liebert XDCF heat loading is dependent on server airflow and server load. Consult factory to determine if sufficient heat load is available from the server for the Liebert XD system to operate effectively.*

## 3.6 Liebert XDO Placement

### 3.6.1 Determining Spacing of Liebert XDOs in an Aisle

Liebert XDO units should be placed in rows directly above the cold aisles of a room for optimum cooling. Each Liebert XDO serves an area equal in width to the cold aisle spacing, typically 12 to 16 feet (3.7 to 4.9m). The length of the area served includes any space between Liebert XDO modules in a row. Depending on the cooling capacity to be achieved, spacing between Liebert XDO modules in a row may vary from zero to as much as 6 feet (1.8m). When the spacing increases to more than 6 feet (1.8m), overall performance of the system may be negatively affected and gaps in cooling may occur.

Liebert recommends installing one Liebert XDO at the end of each aisle being cooled and to space the remainder between these end units in pairs as shown in **Figure 16**. This layout will block the incursion of hot air around the side of the end cabinets.

**Figure 15 Liebert XDO placement over cold aisle**

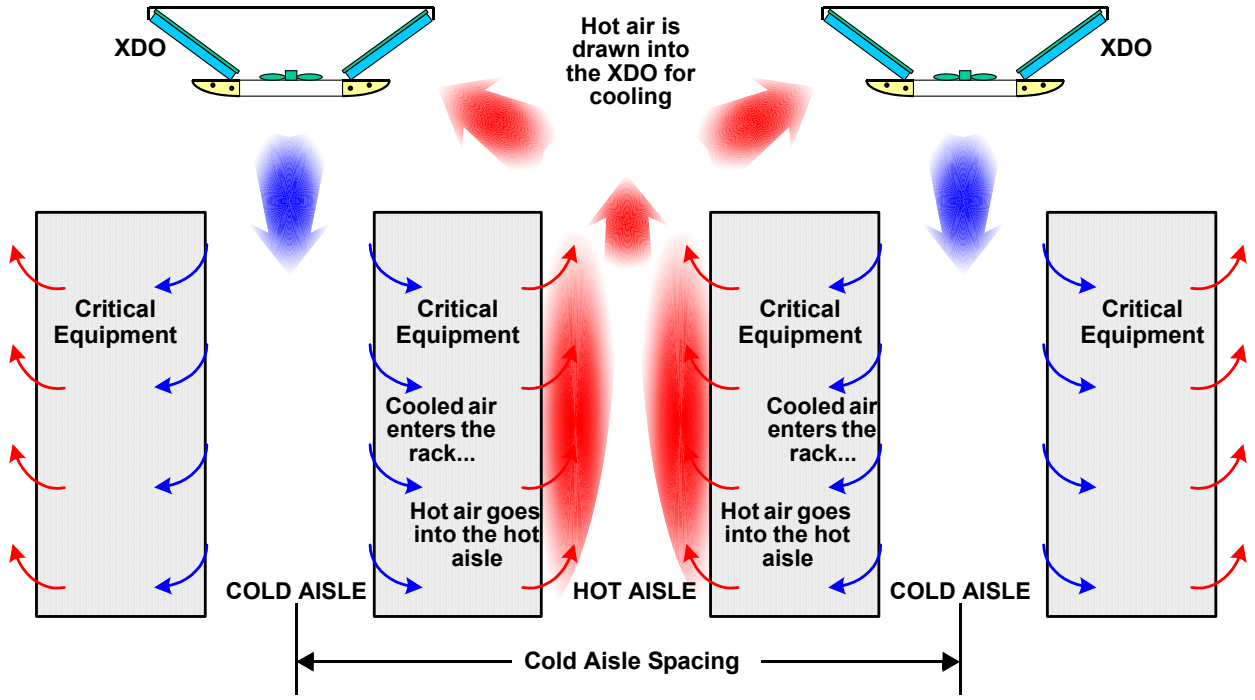


**Table 3** can be used to determine the correct number and spacing of Liebert XDOs.

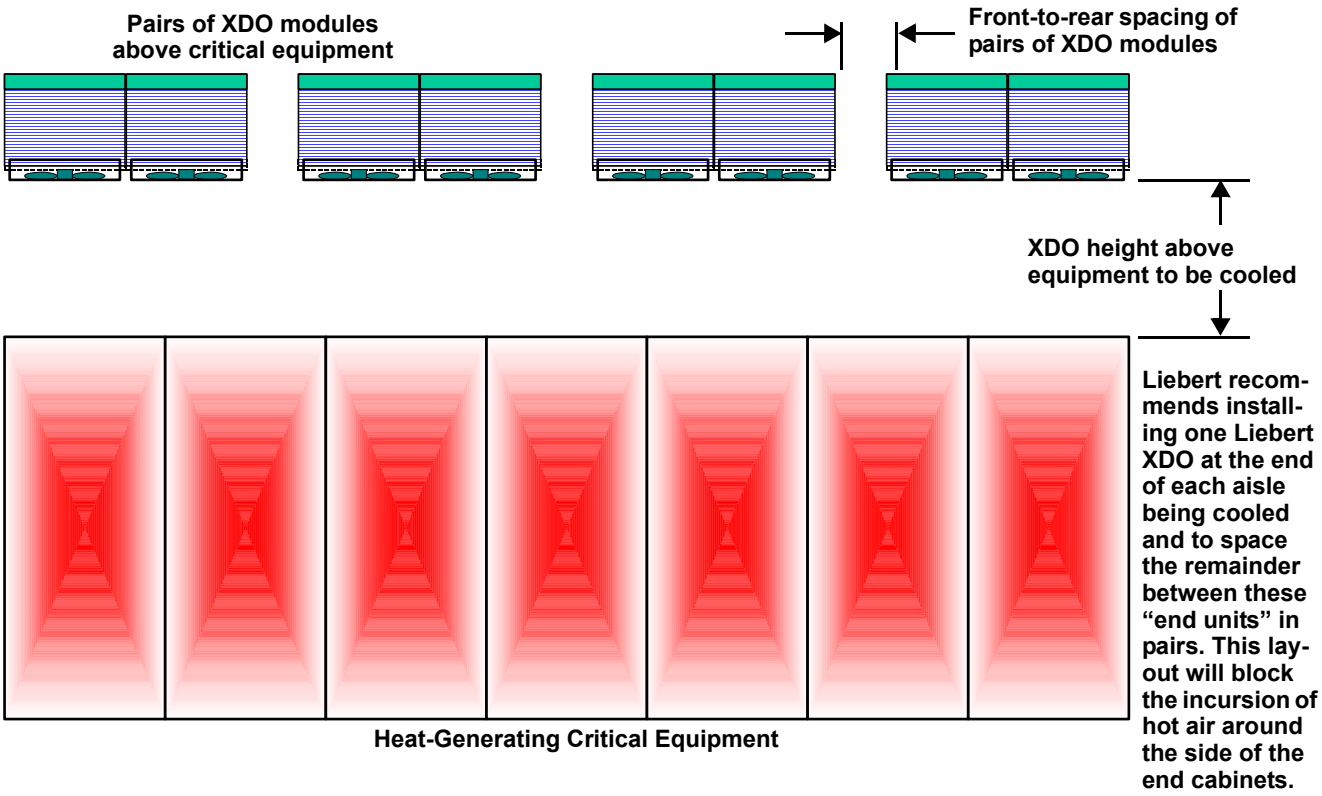
**Table 3 Calculating quantity and spacing of Liebert XDO modules (example below is Liebert XDO20)**

| Input Information | Step | Result |
|---|---|---|
| Total heat load in the room, kW | A | |
| Reserve capacity needed<br>(10% to 25% of A is recommended) | B | |
| | C | Required cooling capacity, kW = A + B |
| Existing/planned Liebert Deluxe/DS unit sensible capacity, kW | D | |
| | E | Required Liebert XD system cooling capacity, kW = C – D |
| | F | Number of Liebert XDO20s required = E ÷ 20, rounded up (60Hz)<br>= E ÷ 16, rounded up (50Hz) |
| | G | Number of Liebert XDP/Liebert XDC modules required = F ÷ 8, rounded up (60Hz and 50Hz) |
| Room area, square feet | H | |
| | I | Area served by each Liebert XDO20 = H ÷ F |
| Spacing of cold aisles, center-to-center, typically 12-16 ft (3.7 to 4.9m) | J | |
| | K | Spacing between each Liebert XDO = (I ÷ J) - 2 |
| | L | Required Liebert XD system cooling density = E x 1000 ÷ H<br>OK if under 640; otherwise, additional cooling is required from Liebert Deluxe or Liebert DS units. |

### 3.6.2 Determining Vertical Placement of Liebert XDOs Above the Cold Aisle

In the maximum density configuration, Liebert recommends placing the Liebert XDOs between 18 and 24 inches (457-609mm) above the equipment cabinets. In some cases where the required density is less, the front-to-rear spacing of Liebert XDOs in a row will be increased. To ensure coverage of the wider spaces between the Liebert XDO units, the vertical distance between the cabinets and the Liebert XDOs should be increased. However, the recommended maximum height of the Liebert XDO above the cabinets is 30 inches (762mm). See **Figures 16**.

**Figure 16 Liebert XDO spacing—horizontal and vertical**

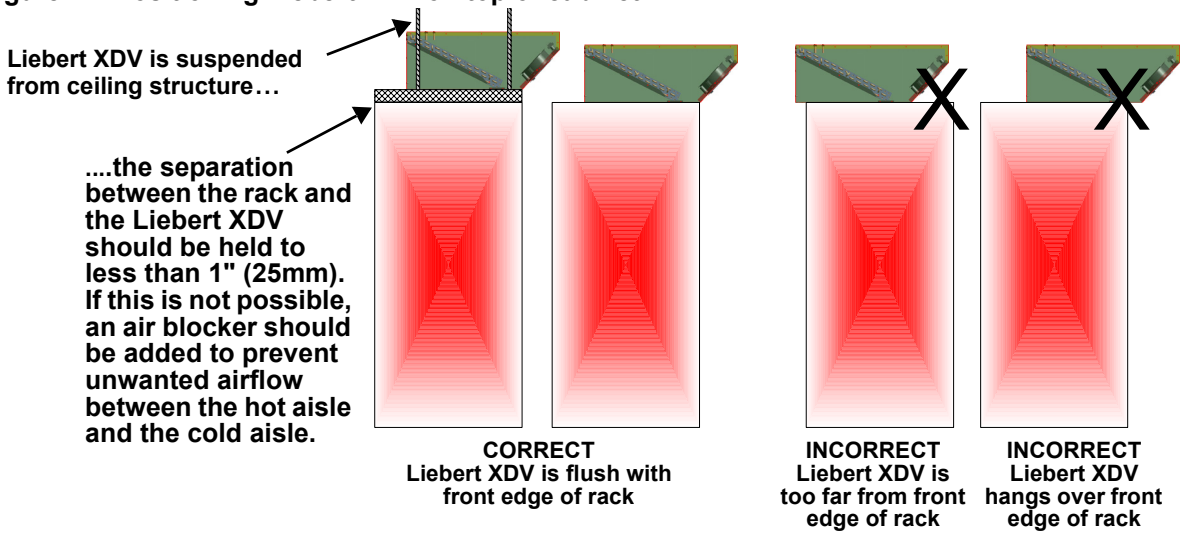

Pairs of XDO modules above critical equipment
Front-to-rear spacing of pairs of XDO modules
XDO height above equipment to be cooled
Liebert recommends installing one Liebert XDO at the end of each aisle being cooled and to space the remainder between these "end units" in pairs. This layout will block the incursion of hot air around the side of the end cabinets.
Heat-Generating Critical Equipment

## 3.7 Liebert XDV Unit Placement

Liebert XDV units should be placed on top of the cabinets that generate the greatest amount of heat. If heat loads are dispersed evenly throughout the room, the Liebert XDV modules may be spread out accordingly.

The Liebert XDV must be placed toward the front of the equipment cabinet, so that its front bottom edge is flush with the front top edge of the cabinet. Placing the unit farther back on the top of the unit will restrict airflow into the cold aisle. Placing the unit farther to the front will decrease the amount of hot air drawn into the unit.

**Figure 17 Positioning Liebert XDV on top of cabinet**


Liebert XDV is suspended from ceiling structure…
....the separation between the rack and the Liebert XDV should be held to less than 1" (25mm). If this is not possible, an air blocker should be added to prevent unwanted airflow between the hot aisle and the cold aisle.
CORRECT
Liebert XDV is flush with front edge of rack
INCORRECT
Liebert XDV is too far from front edge of rack
INCORRECT
Liebert XDV hangs over front edge of rack

Both of the Liebert XDV's power cords should be connected to power sources. If only one power source is available, then only the power cord labeled "SECONDARY" should be connected to the power source.

Piping for the Liebert XDV is routed upward to the main return and supply pipes to and from the Liebert XDP/Liebert XDC.

**Table 4**, below, may be used to determine the correct number of Liebert XDV modules.

**Table 4 Determine required number of Liebert XDV modules (example below is Liebert XDV10)**

| Input Information | Step | Results |
|---|---|---|
| Total heat load in the room, kW | A | |
| Reserve capacity needed (10% to 25% of A is recommended) | B | |
| | C | Required cooling capacity, kW = A + B |
| Existing/planned Liebert Deluxe/ DS sensible capacity, kW | D | |
| | E | Required Liebert XD system cooling capacity, kW = C – D |
| | F | Number of Liebert XDV10 modules required = E ÷ 10, rounded up (60Hz)<br>= E ÷ 8, rounded up (50Hz) |
| | G | Number of Liebert XDP/Liebert XDC modules required = F ÷ 16, rounded up (60Hz and 50Hz) |
| Room area, square feet | H | |
| | I | Area served by each Liebert XDV10 = H ÷ F |
| | L | Required Liebert XD system cooling density = E x 1000 ÷ H<br>OK if under 580 for 12-foot cold aisle spacing<br>OK if under 435 for 16-foot cold aisle spacing<br>Otherwise, additional Liebert Deluxe or Liebert DS unit capacity is needed. |

## 3.8 Liebert XDCF Placement

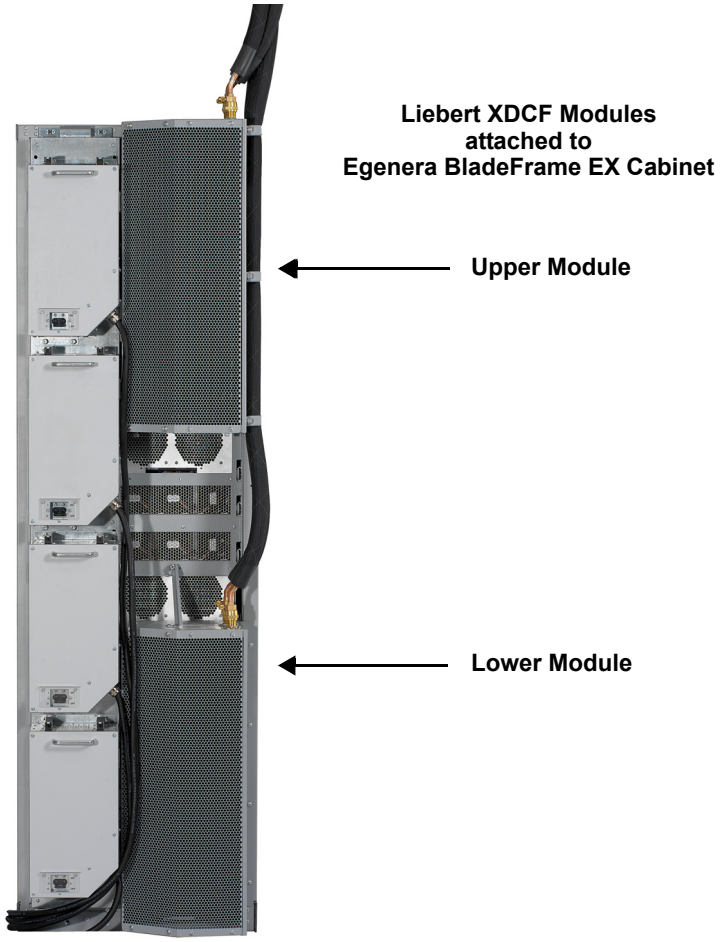
The Liebert XDCF is a self-contained module designed to cool Egenera's BladeFrame EX cabinets and equipment. Liebert XDCF modules attach to the rear of the Egenera BladeFrame EX cabinet, beside the power modules (see **Figure 18**). No cutting or drilling is required to attach the modules; all mounting holes, slots and pins required are fabricated at the factory. The Liebert XDCF does not require electrical connections.

The number of Liebert XDCF modules required is determined by the heat load of the cabinet—cabinets cannot share cooling from a Liebert XDCF module.

The Egenera BladeFrame EX cabinet has provisions for mounting two Liebert XDCF modules, should the heat load require two modules. If only one Liebert XDCF will be needed, Liebert recommends using the lower Liebert XDCF module.

The complete system consists of Liebert XDCF modules, piping, Liebert XDP or Liebert XDC refrigerant distribution units and those units' chillers or drycoolers.

**Figure 18 Liebert XDCF unit mounting locations**



## 3.9 Liebert XDH Placement

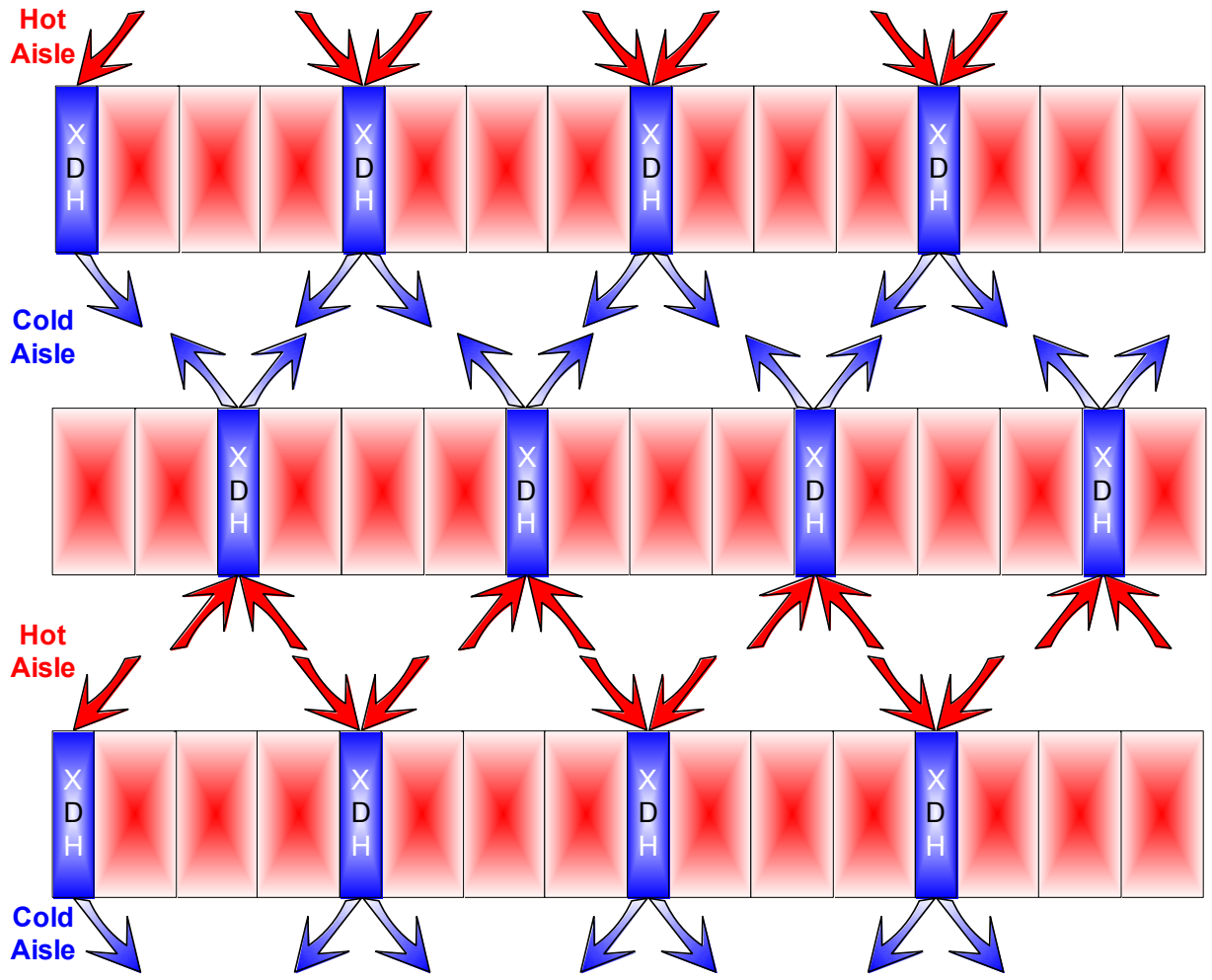
The free-standing Liebert XDH cooling unit is best placed among the equipment cabinets in a hot aisle-cold aisle arrangement (see **Figure 19**). The Liebert XDH draws in air from the hot aisle, cools it and discharges the cooled air into the cold aisle where it is drawn into the equipment cabinets. Regular spacing aids in optimizing cooling.

Liebert XDH units should be placed among the cabinets that generate the greatest amount of heat. If heat loads are dispersed evenly throughout the room, the Liebert XDH modules may be spread out accordingly.

If a Liebert XDH is installed at the end of a row, Liebert recommends using uni-directional air diffusers on that Liebert XDH. The uni-directional diffusers can be used for left or right air discharge by removing them from the Liebert XDH, turning them 180 degrees, then reattaching them to the Liebert XDH.

Liebert recommends using bi-directional air diffusers on Liebert XDH modules installed between racks.

**Figure 19 Liebert XDH placement**




## 3.10 Liebert XDP/Liebert XDC Placement

The Liebert XDP/Liebert XDC may be placed in the critical space or in an adjacent equipment room. The allowable distance between the Liebert XDP/Liebert XDC and its connected cooling modules is determined by the piping design and by the amount of refrigerant required. Refer to **3.12 - Liebert XD Refrigerant** and **3.13 - Liebert XD Piping System Design**.

The maximum height of any of the main or connecting piping should be no more than 20 feet (6m) above the top of the Liebert XDP/Liebert XDC unit. Liebert XDV/Liebert XDO modules should be placed as close to the same level as possible. The differences in elevation between the highest and lowest Liebert XDV or Liebert XDO module in a system should be no more than 6 feet (2m).

## 3.11 Examples of Expansion and Interlaced Connection of Liebert XD Cooling Modules

**Figure 20 Liebert XDV units mounted on racks emitting 3kW of heat, top view**

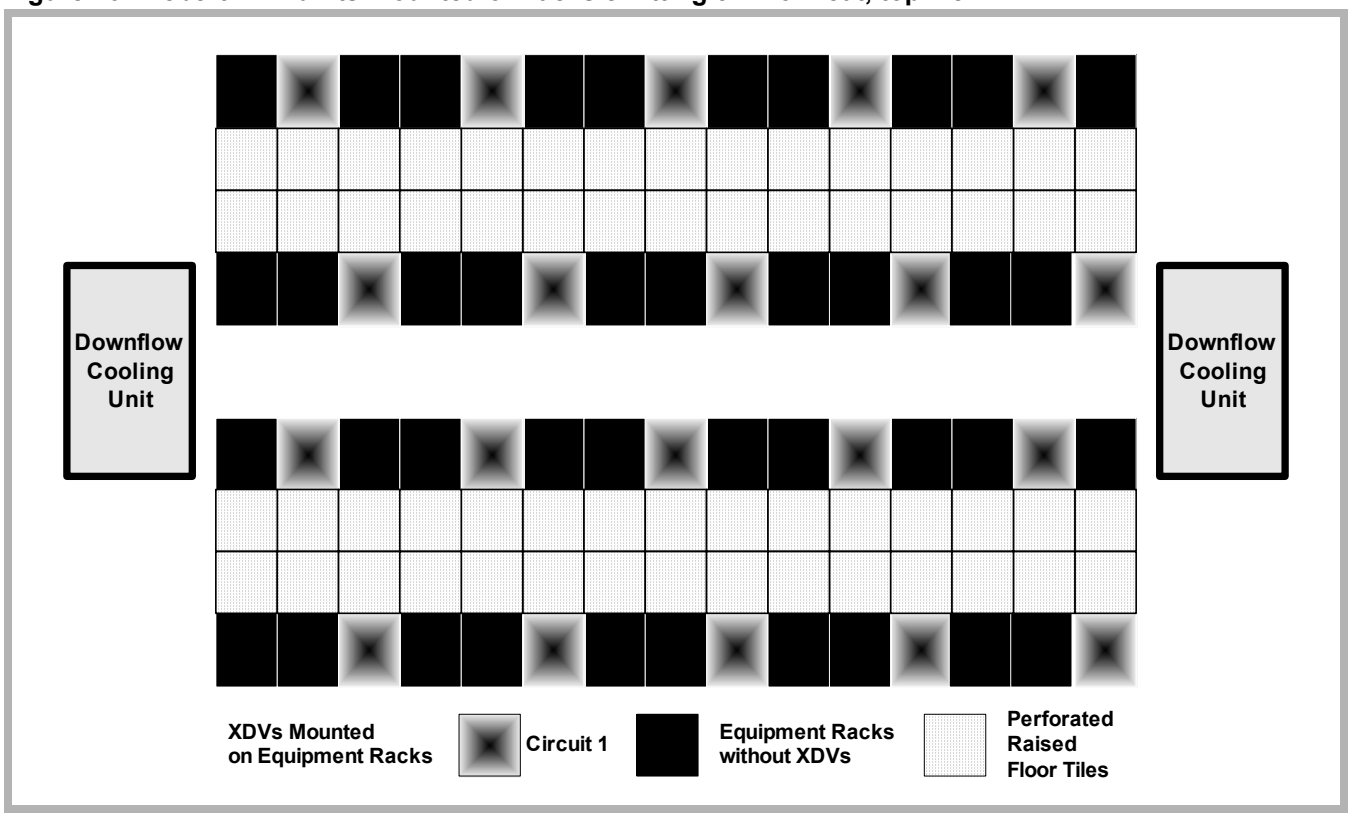



**Figure 21 Liebert XDV units mounted on racks emitting 5kW of heat, top view**

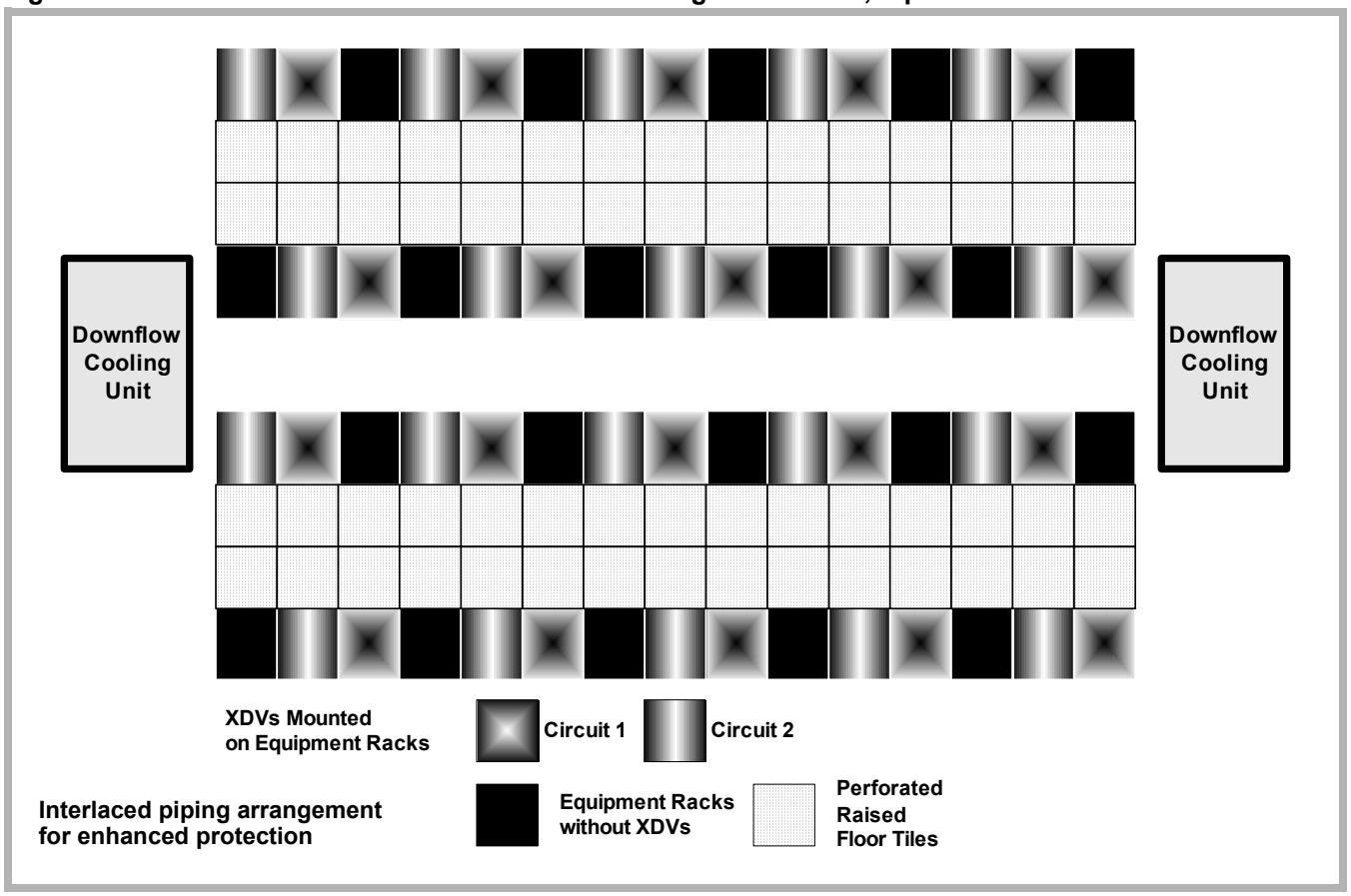


**Figure 22 Liebert XDV units mounted on racks emitting 8kW of heat top view**

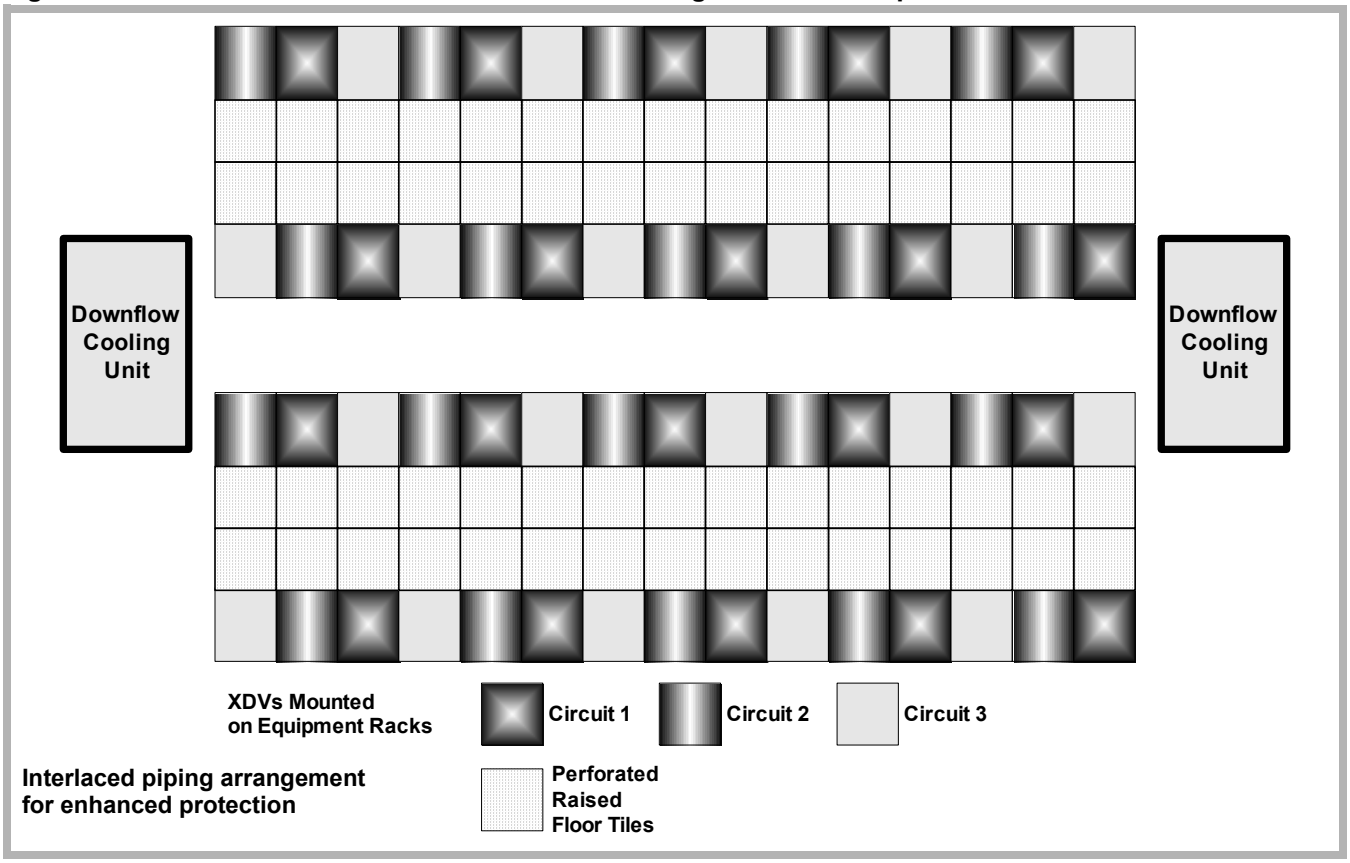
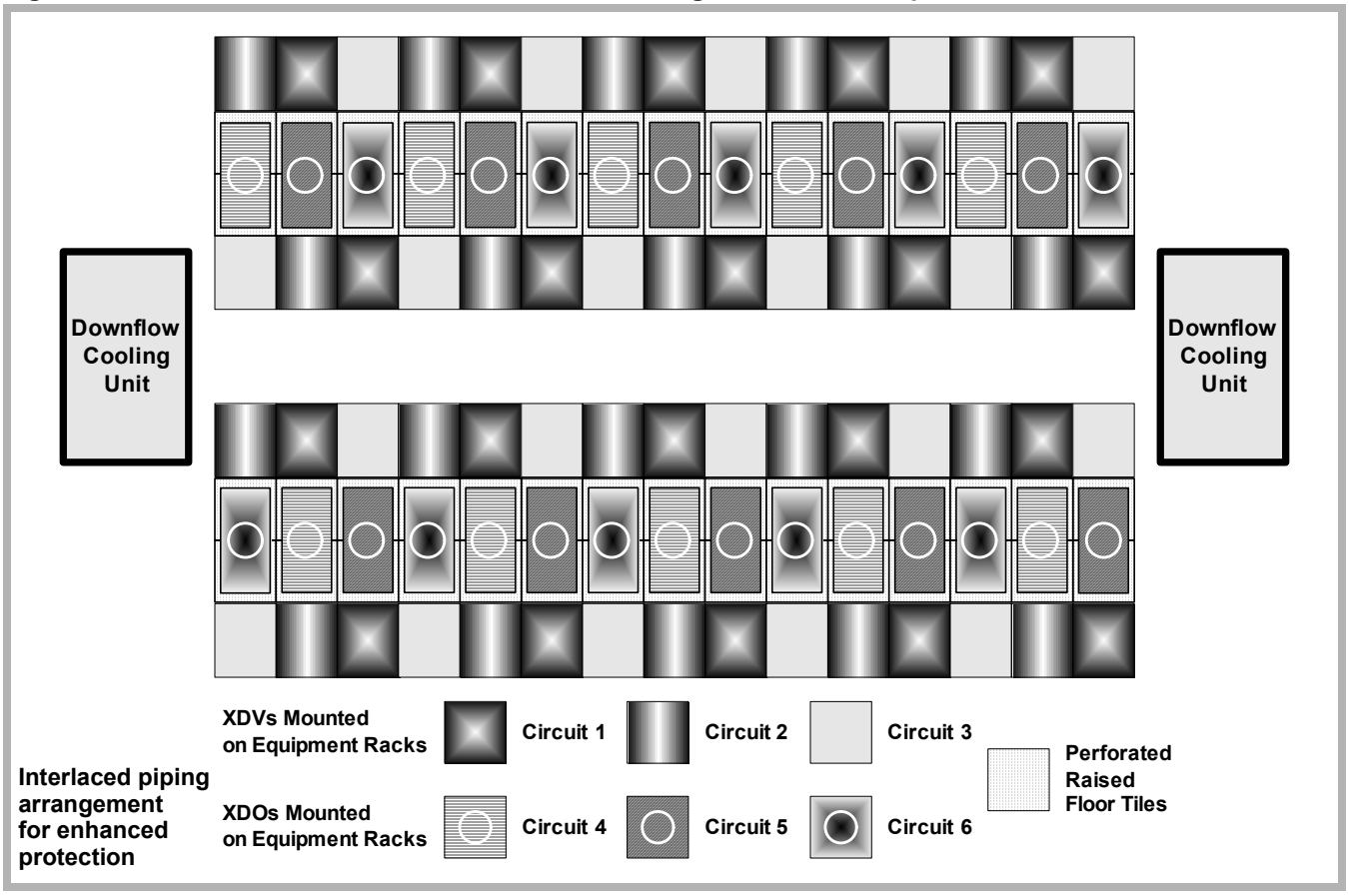



**Figure 23 Liebert XDV units mounted on racks emitting 16kW of heat top view**



## 3.12 Liebert XD Refrigerant

The refrigerant used in the Liebert XD system is HFC-134a (1,1,1,2-tetrafluoroethane), made by a number of manufacturers. The amount of refrigerant used by the Liebert XD system may be significantly higher than in typical DX cooling systems.

**CAUTION**

Risk of improper oil use. Can cause equipment damage.

The Liebert XD pumped R-134a refrigerant circuits do not use refrigerant oil. Do NOT put oil in the R-134a system.

All the major components of a Liebert XD system must be installed in a space with a volume of at least 1,000 $ft^3$ (28.3$m^3$) for each 16 pounds of refrigerant in that system from *Table 1, ASHRAE Standard 15-2001, Safety Standard for Refrigeration Systems*. If the Liebert XDP/Liebert XDC is placed in a separate area, such as a machine room, then this area must also meet the volume requirement. Inside the critical space, this includes the space under the raised floor, and the space between the top of the raised floor and the bottom of a suspended ceiling. If the suspended ceiling is all open grates, then this additional space, up to the overhead deck, would also be included.

**Example**

A space is 5,000 square feet, with an 18" raised floor and an 8' 6" suspended ceiling. Liebert XDOs and a Liebert XDP are to be placed in this raised-floor area.

The volume of the space is (1.5 + 8.5) x 5,000 or 50,000 cubic feet.

The maximum amount of R-134a refrigerant that can be used in a single Liebert XDP/Liebert XDC/Liebert XD module system within this space is **16 * (50000/1000) = 16 * 50 = 800 lb**.

Multiple Liebert XD systems can be installed in this space, as long as the amount of R-134a refrigerant in any one system does not exceed 800 lb.

**NOTE**

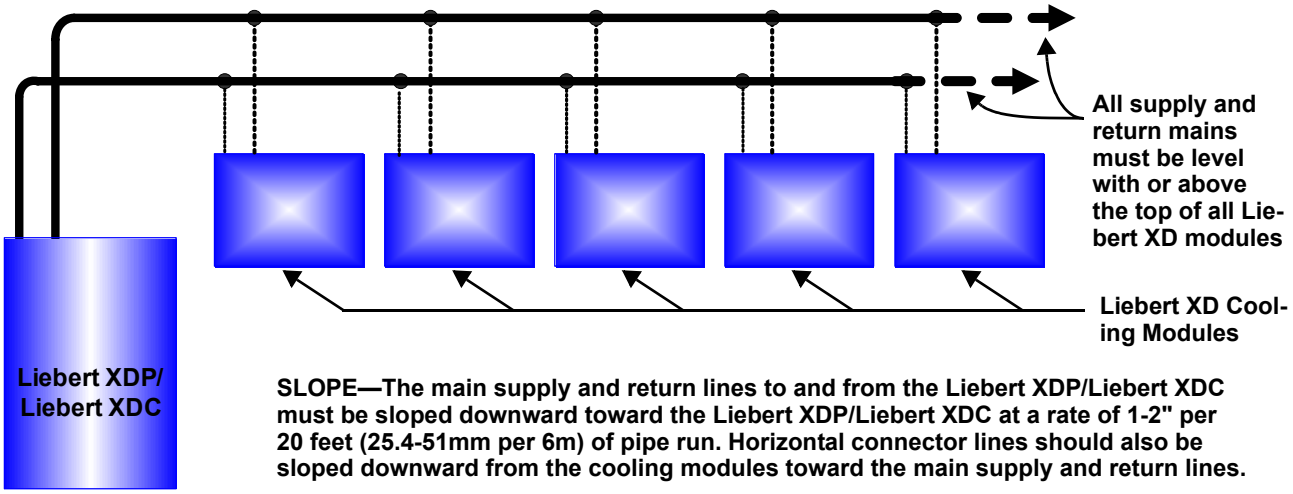
*Local codes might permit exceeding the maximum refrigerant limit stated above if refrigerant detector and an exhaust system are installed. As an alternative, oxygen sensors may be installed to meet some local codes.*

## 3.13 Liebert XD Piping System Design

All piping must be ASTM (American Society for Testing and Materials) Type "L" copper pipe. The typical maximum operating pressure in the system is 90 psi (620kPa).

Piping for the Liebert XD system is arranged in a manner similar to piping for a chilled water system. Liebert XD cooling modules (Liebert XDCF, Liebert XDH, Liebert XDO or Liebert XDV) are connected in parallel between the main return and supply pipes going to and from the Liebert XDP/Liebert XDC. **Figure 24** represents a typical configuration. **The guidelines provided for pipe size must be strictly followed. Failure to size the main lines and connection lines adequately may result in reduced cooling capacity.** The critical aspects of pipe sizing are related to refrigerant volume and pressure drop. Each must be minimized.

**Figure 24 Piping for Liebert XDP/Liebert XDC used with Liebert XD cooling units**


All supply and return mains must be level with or above the top of all Liebert XD modules
Liebert XD Cooling Modules
Liebert XDP/ Liebert XDC
SLOPE—The main supply and return lines to and from the Liebert XDP/Liebert XDC must be sloped downward toward the Liebert XDP/Liebert XDC at a rate of 1-2" per 20 feet (25.4-51mm per 6m) of pipe run. Horizontal connector lines should also be sloped downward from the cooling modules toward the main supply and return lines.

The assembly and connection means used for piping in the Liebert XD system are similar to that of conventional refrigeration systems. All piping should be installed with high temperature brazed joints. Soft solder is not recommended. The lines being brazed MUST be filled with flowing dry nitrogen during brazing to prevent excessive oxidation and scale formation inside the piping.

Insulate all piping lines to prevent condensation in applications where the dew point approaches the R-134a refrigerant temperature.

Please see **Table 5** below for recommended pipe sizes and **Figure 25** for piping segment locations.

**Table 5 Supply, return pipe sizes for refrigerant loop**

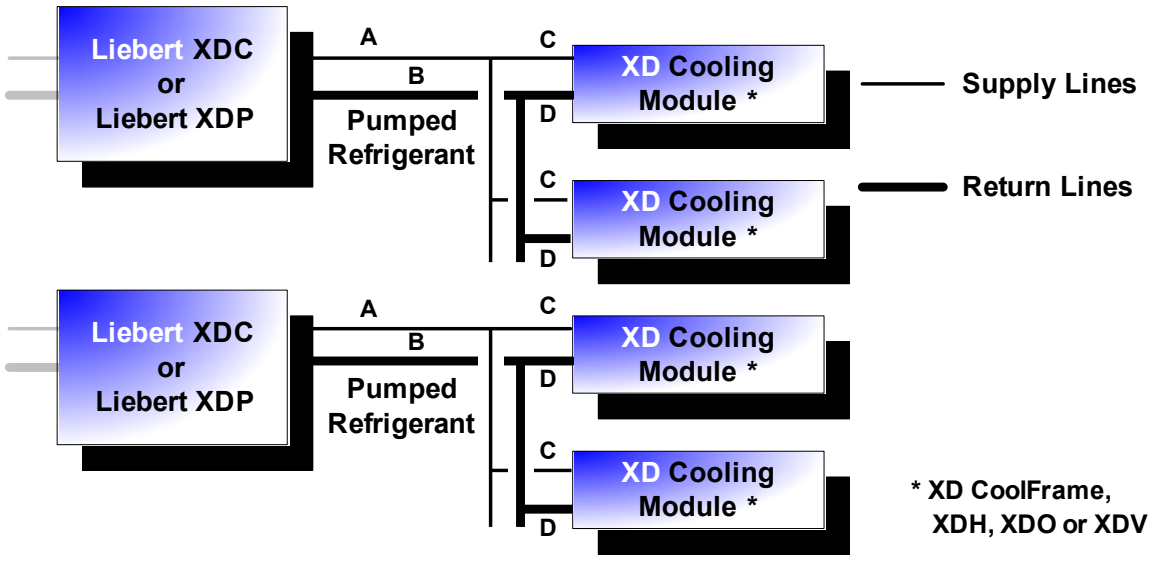
| Pipe Function | Key to Piping in Figure 25 | Size / Equivalent Pipe Length |
|---|---|---|
| Liebert XDP supply line, from Liebert XDP supply to farthest Liebert XD cooling module | A | 1-1/8" OD for lengths up to 60 feet |
| | | 1-3/8" OD for lengths over 60 but less than 175 feet |
| Liebert XDP return line, from farthest Liebert XD cooling module to Liebert XDP return | B | 2-1/8" OD for lengths up to 60 feet |
| | | 2-5/8" OD for lengths over 60 but less than 175 feet |
| From any model Liebert XDO/Liebert XDH supply to supply line of Liebert XDP | C | 1/2" OD for lengths up to 10 feet |
| | | 7/8" OD for lengths over 10 but less than 25 feet |
| From any model Liebert XDO/Liebert XDH return to return line of Liebert XDP | D | 7/8" OD for lengths up to 10 feet |
| | | 1-1/8" OD for lengths over 10 but less than 25 feet |
| From any model Liebert XDV/Liebert XDCF supply to supply line of Liebert XDP | C | 1/2" OD for lengths up to 10 feet |
| | | 5/8" OD for lengths over 10 but less than 35 feet |
| From any model Liebert XDV/Liebert XDCF return to return line of Liebert XDP | D | 5/8" OD for lengths up to 10 feet |
| | | 7/8" OD for lengths over 10 but less than 35 feet |

For additional information about piping connections, see the unit's user manual: Liebert XDP, 16641; Liebert XDC, SL-16671; Liebert XDO, SL-16666; Liebert XDV, SL-16626; Liebert XDCF, SL-16678; and Liebert XDH20 and Liebert XDH32, SL-17210.

**NOTE**

*To minimize the amount of refrigerant required, do NOT oversize the piping.*

**Figure 25 Hydraulic diagram**




## 3.14 Liebert XD Piping Slope

The main supply and return lines to and from the XDP/XDC must be sloped downward toward the XDP/XDC at a rate of 1-2" per 20 feet (25-51mm per 6m) of pipe run. Horizontal connector lines should also be sloped downward from the cooling modules toward the main supply and return lines.

## 3.15 Bypass Flow Controllers

To ensure the XDP/XDC pumps operate within the optimum range, some installations require one or more bypass flow controller(s). These devices are added to the field piping, and simulate the flow of additional cooling modules.

Each bypass flow controller should be installed with one shutoff valve to allow the controller to be disabled when cooling modules are added to a Liebert XD system.

If bypass flow controllers are required, they should be connected between the main supply and the main return lines of the field piping. The connection points to the main supply and return lines should be in a convenient and accessible location between the Liebert XDP/Liebert XDC and the first Liebert XD module in the circuit. See **Figures 27** and **26** for piping details of the bypass flow controller.

Refer to **Table 6** to determine the number of bypass flow controllers needed, based on the total nominal cooling capacity of the cooling modules in each Liebert XD system.

**Table 6 Bypass flow controllers for Liebert XDC- or Liebert XDP-based systems**

| Cooling Modules - Cumulative Model Size | Required Number of Bypass Flow Controllers | |
|---|---|---|
| | Liebert XDP | Liebert XDC |
| 32 to 63 | 3 | N/A |
| 64 to 95 | 2 | 2 |
| 96 to 127 | 1 | 1 |
| 128 to 160 | 0 | 0 |

**Figure 26 Bypass flow controller details, dimensions**

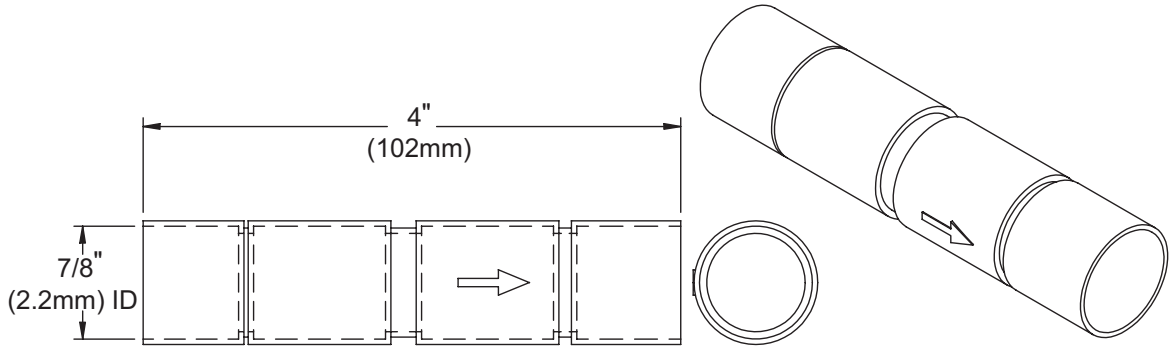



**Figure 27 Bypass flow controller arrangement**

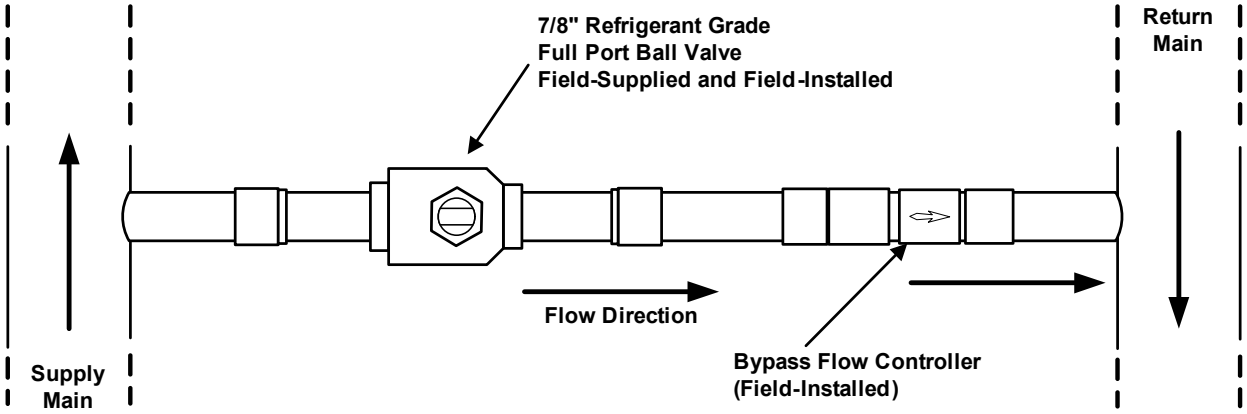
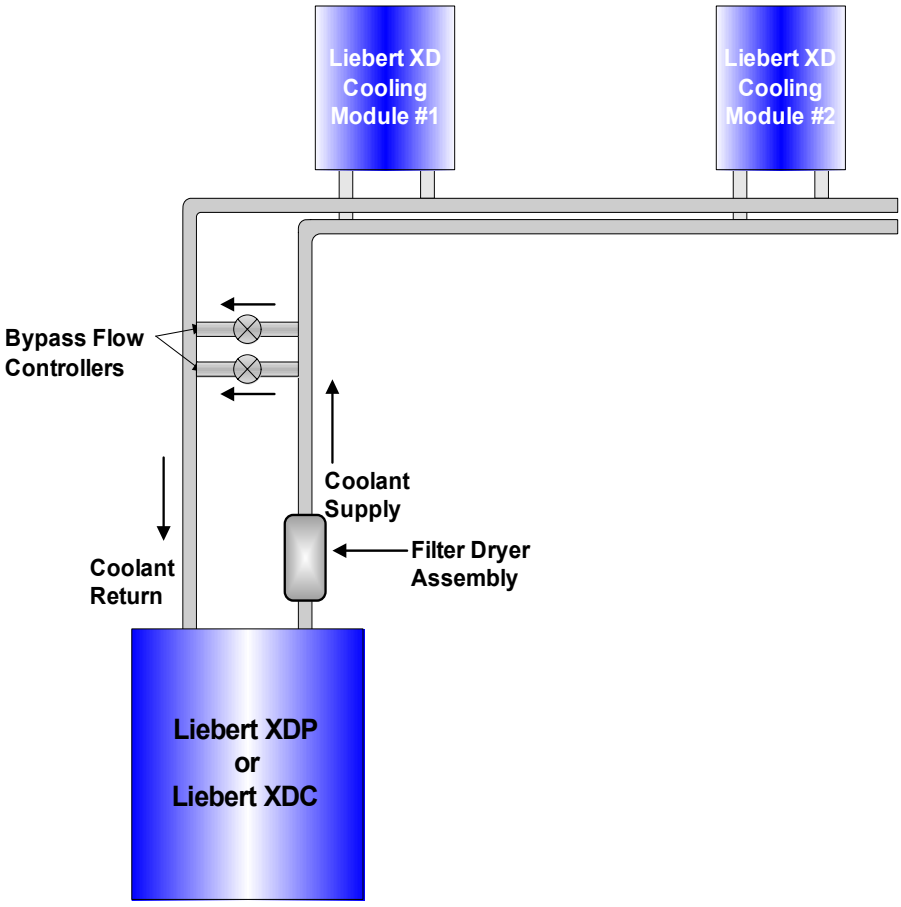



**Figure 28 Bypass flow controller piping**



## 3.16 Determining Refrigerant Volume

After the preliminary system design is completed, **Tables 7**, through **15** may be used to determine the amount of refrigerant required. Perform the calculation below for each Liebert XD system being configured.

**NOTE**
*All lengths in* **Tables 7**, **8**, **9** and **10**, *are actual pipe lengths, not equivalent pipe lengths.*

### 3.16.1 Liebert XDP/Liebert XDC Pumped R-134a Circuit Volume

**NOTE**
*System refrigerant volume calculations in* **Tables 7**, **8**, **9** and **10**, *are based on a fully loaded system. Additional charge may be required for lightly loaded systems.*

**Table 7 System R-134a charge for a Liebert XDP/Liebert XDC with any model Liebert XDH/ Liebert XDO/Liebert XDV/Liebert XDCF**

| Refrigerant Charge, lb (kg) | Per Liebert XD Unit (Excludes Connector Lines to and from Liebert XD Cooling Module) |
|---|---|
| 157 lb. (65.7kg) | Liebert XDP/Liebert XDC |
| 3.55 lb. (0.66kg) | Liebert XDO |
| 2.32 lb. (1.05kg) | Liebert XDV |
| 5.32 lb. (2.41kg) | Liebert XDH |
| 1.41 lb. (0.64kg) | Liebert XDCF |

**Table 8 System refrigerant charge for the supply and return mains**

| Refrigerant Charge, lb/foot (kg/m) | Supply/Return Main Length and Diameter |
|---|---|
| 0.45 (0.67) | Main supply actual length per 1-1/8" OD copper tubing |
| 0.68 (1.01) | Main supply actual length per 1-3/8" OD copper tubing |
| 0.28 (0.42) | Main return actual length per 2-1/8" OD copper tubing |
| 0.43 (0.64) | Main return actual length per 2-5/8" OD copper tubing |

**Table 9 R-134a refrigerant charge for hard-piped connector lines to and from any model Liebert XDH/Liebert XDO/Liebert XDV/Liebert XDCF**

| Refrigerant Charge, lb/foot (kg/m) | Hard-Piped Connector Length and Diameter |
|---|---|
| 0.08 (0.12) | 1/2" OD Liebert XDO/Liebert XDH/Liebert XDV/Liebert XDCF supply connector actual length |
| 0.13 (0.19) | 5/8" OD copper tubing Liebert XDV/Liebert XDCF supply connector actual length |
| 0.26 (0.39) | 7/8" OD Liebert XDO/Liebert XDH supply connector actual length " |
| 0.02 (0.03) | 5/8" OD copper tubing Liebert XDV/Liebert XDCF return connector actual length |
| 0.04 (0.06) | 7/8" OD copper tubing Liebert XDV/Liebert XDCF return connector actual length |
| 0.04 (0.06) | 7/8" OD copper tubing Liebert XDH/Liebert XDO return connector actual length |
| 0.07 (0.1) | 1-1/8" OD copper tubing Liebert XDH/Liebert XDO return connector actual length |

**Table 10 R-134a refrigerant charge for Flex Pipe connector lines to and from any model Liebert XDO/Liebert XDH/Liebert XDV/Liebert XDCF**

| Refrigerant Charge, lb. (kg) | Metal Flex Pipe Connector Length |
|---|---|
| **Supply Line Diameter 1/2"** | |
| 0.3 lb. (0.14) | 4 ft. Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.5 lb. (0.23) | 6 ft. Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.7 lb. (0.32) | 8 ft. Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.8 lb. (0.36) | 10 ft. Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| **Return Line Diameter 5/8"** | |
| 0.01 lb. (0.01) | 4 ft. Flex Pipe existing Liebert XDV systems |
| 0.02 lb. (0.01) | 6 ft. Flex Pipe existing Liebert XDV systems |
| 0.03 lb. (0.01) | 8 ft. Flex Pipe existing Liebert XDV systems |
| 0.03 lb. (0.01) | 10 ft. Flex Pipe existing Liebert XDV systems |
| **Return Line Diameter 1"** | |
| 0.13 lb. (0.05) | 4 ft Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.2 lb. (0.09) | 6 ft Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.27 lb. (0.12) | 8 ft Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |
| 0.33 lb. (0.15) | 10 ft Flex Pipe Liebert XDH/Liebert XDO/Liebert XDV/ Liebert XDCF supply |

### 3.16.2 Calculating Refrigerant Charge—Example

Using **Tables 7**, **8**, **9** and **10**, calculate the refrigerant charge of the individual sections of your Liebert XD system. Add the calculated charge amounts to determine the amount of R-134a refrigerant required for one system combining a Liebert XDP with Liebert XD cooling modules (Liebert XDCF, Liebert XDH, Liebert XDO and Liebert XDV). The example below combines one Liebert XDP with 20 Liebert XDV8 cooling modules.

**Table 11 Calculating refrigerant charge—example**

| Components | Number of Units or Piping Length, feet | Pounds Per Component | Total, lb. |
|---|---|---|---|
| Liebert XDP/Liebert XDC | 1 | 157 | 157 |
| Liebert XDV8 Cooling Modules | 20 | 2.32 | 46.4 |
| Supply Main, 1-1/8" | 100 | 0.45 | 45 |
| Return Main, 2-1/8" | 100 | 0.28 | 28 |
| Liebert XDV 1/2" supply Flex Pipes | 20 | 0.8 | 16 |
| Liebert XDV 5/8" return Flex Pipes | 20 | 0.03 | 0.6 |
| | | **Total** | **293** |

**Table 12 Worksheet to calculate refrigerant charge**

| Components | Number of Units or Piping Length | Pounds Per Component | Total |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | **Total** | |

Verify that the refrigerant volume of the Liebert XD system with the longest piping length is within the allowable limit. If the allowable limit is exceeded, the Liebert XDP/Liebert XDC should be moved closer to the cooling modules (refer to **3.12 - Liebert XD Refrigerant** for limits and related details). Another way to shorten the total pipe length is to reroute the pipe runs.

## 3.17 Liebert XDC DX R-407c Circuit Volume—Air Cooled Units

Weigh in the calculated charge based on **Tables 13**, **14** and **15**.

**Table 13 Indoor unit refrigerant charge—R-407c**

| Model 60/50 Hz | Charge/Circuit, lb. (kg) |
|---|---|
| Liebert XDC160 | 17.5 (8.0) |

**Table 14 Outdoor condenser charge—R-407c**

| Model | Charge / Circuit, lb (kg) |
|---|---|
| CDL830 | 200 (90.8) |
| CSL616 | 254 (115.2) |
| CSL415 | 200 (90.8) |

**Table 15 Air cooled systems - liquid line charge - R-407c refrigerant per 100 ft (30 m) of Type "L" copper tube**

| O.D., inches | Liquid Line, lb (kg) | Hot Gas Line, lb (kg) |
|---|---|---|
| 3/8 | 3.7 (1.7) | - |
| 1/2 | 6.9 (3.1) | - |
| 5/8 | 11.0 (5.0 | 2.2 (1.0) |
| 3/4 | 15.7 (7.1) | 3.1 (1.4) |
| 7/8 | 23.0 (10.4) | 17.5 (8.0) |
| 1-1/8 | 39.3 (17.8) | 7.8 (3.5) |
| 1-3/8 | 59.8 (27.1 | 11.8 (5.4) |
| 1-5/8 | - | 16.7 (7.6) |

**Table 16 Indoor water/glycol cooled module – R-407C refrigerant charge**

| Model 60 Hz | Charge / Circuit, lb(kg) |
|---|---|
| Liebert XDC 160 | 30.0 (13.2) per circuit |

## 3.18 Chilled Water Piping

The Liebert XDP is offered only with a two-way chilled water control valve. Some applications may require the use of a pressure activated bypass valve, to prevent dead-heading of the chilled water pump. This bypass valve must be specified by the engineer responsible for design of the chilled water field piping system.

Chilled water connections to the Liebert XDP are near the bottom of the unit. Refer to the Liebert XDP user manual (SL-16641) for further information. Piping is routed downward from the unit to chilled water piping under the raised floor. Connections are made using standard practices for copper chilled water piping. Victaulic® connections may be used to simplify installation in existing facilities. Refer to **Table 31** for additional information.

## 3.19 Electrical

Make all wiring and electrical connections in accordance with local and national codes. Refer to the applicable table in **5.0 - Specifications** regarding wire size and circuit protection requirements. Refer to electrical schematic when making connections.

# 4.0 LIEBERT XD COOLING MODULES—LIEBERT XDO, LIEBERT XDV, LIEBERT XDH AND LIEBERT XDCF

## 4.1 Liebert XDO Standard Features

- Micro Channel Heat Exchanger—The Liebert XDO unit includes two all-aluminum micro channel heat exchangers.
- Fan—Air is drawn in the sides of the unit through the heat exchangers and is discharged by the fan to the area below—Liebert XDO fan tray hinges down to allow access to replace or service all electrical components.
- Internal Mounting—The Liebert XDO unit is typically suspended from the overhead building structure by inserting field-supplied threaded rods into the internal mounting brackets.

### 4.1.1 Optional Features Liebert XDO

- **Refrigerant Pre-Charge**—Liebert XDO units with the pre-charged refrigerant option will have one-shot fittings that contain pressurized refrigerant inside the Liebert XDO. The fittings ease connection to Liebert XD Piping and filling with refrigerant.
- **Field-Installed Flexible Piping** (for use with prefabricated piping assemblies)—Field-installed flexible piping kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8, 2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefabricated piping assembly is with a threaded coupler. For information on acquiring the correct kit for your installation, refer to DPN000781_Rev1, available from Liebert by calling 1-800-LIEBERT and from your local Liebert representative.
- **External Mounting Brackets**—The Liebert XDO unit can be suspended by external mounting brackets that are attached to the front and rear panels of the unit. The external mounting brackets are optional ship-loose items.
- **Condensate Detection**—The Liebert XDO unit is available with optional factory-installed condensate detection. The condensate detection has connection points (dry contacts) inside the unit.
- **Lighting Fixture**—Field-installable lighting fixtures are available in two voltages, 120V and 277V. Light Fixture maybe attached to the bottom of the light panel to the left and right of the fan. Each fixture consists of housing, reflector, ballast and diffuser. Fixtures are compatible with standard 48" fluorescent tubes. Lamps are not included.

**Figure 29 Dimensional data—Liebert XDO hard-piped units**

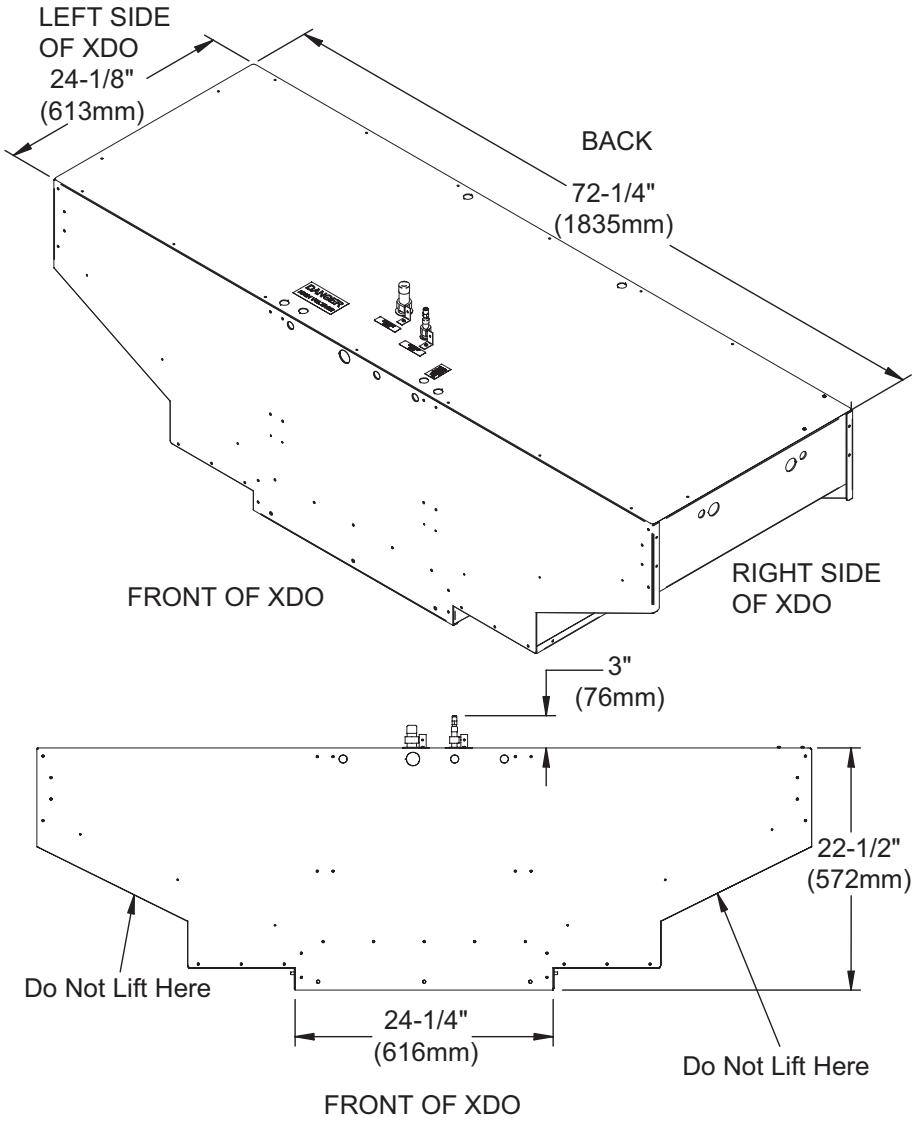


**Figure 30 Dimensional data—Liebert XDO with pre-charged option**

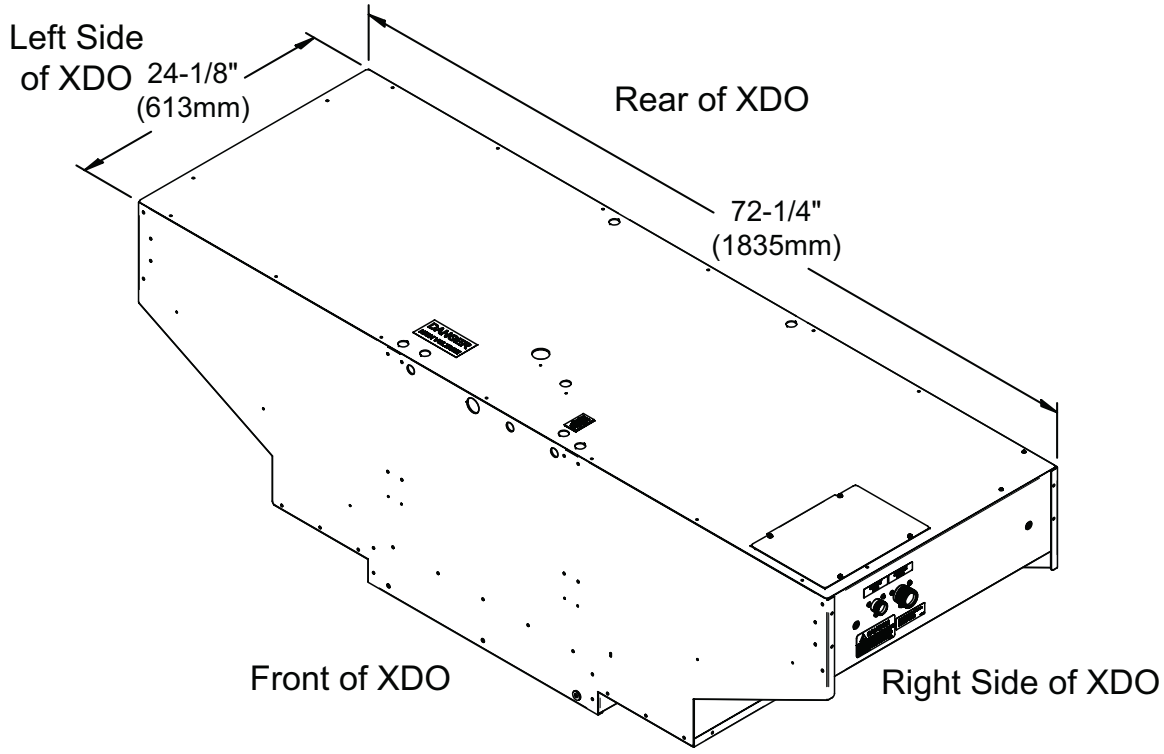


**Figure 31 Liebert XDO internal mounting location**

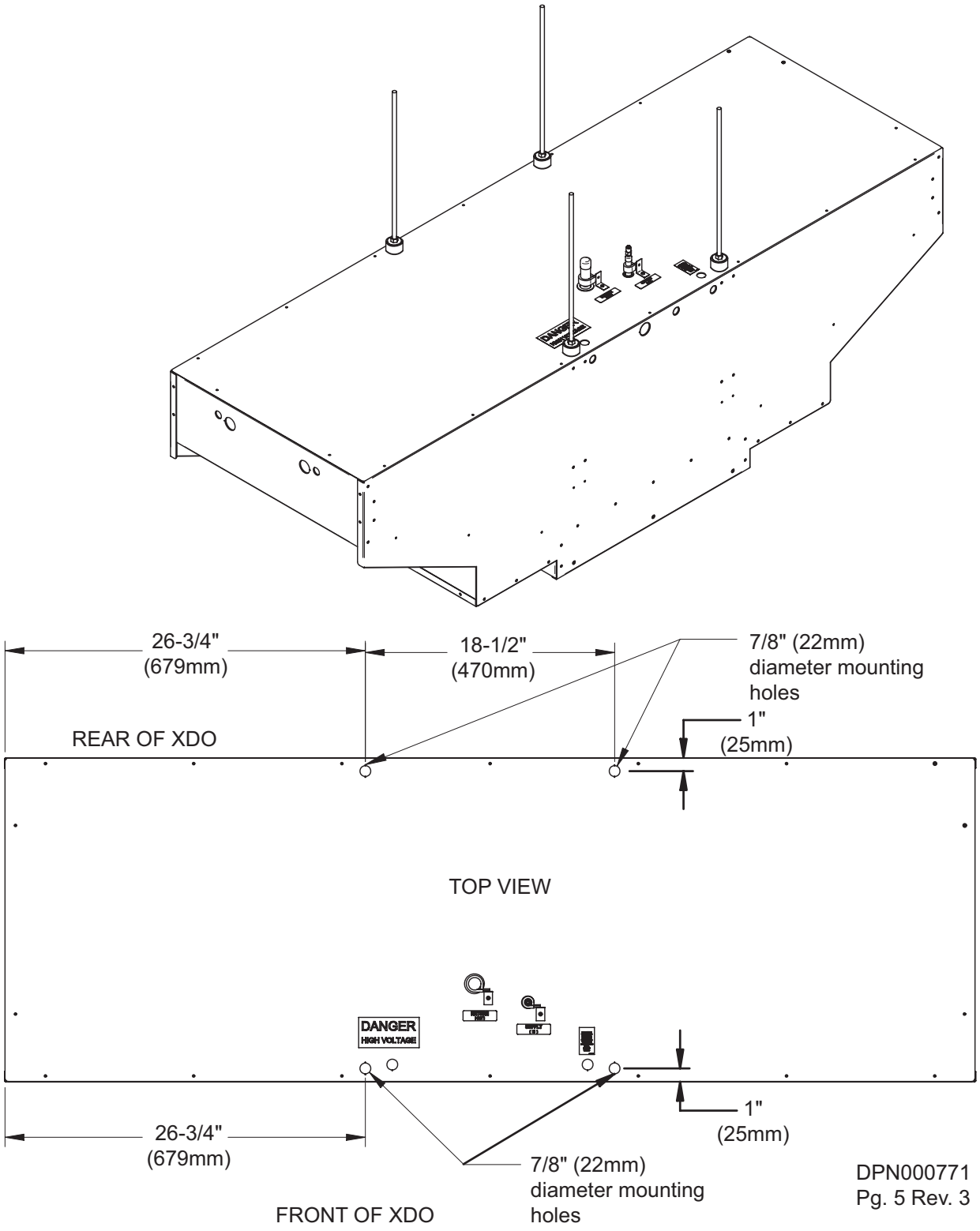
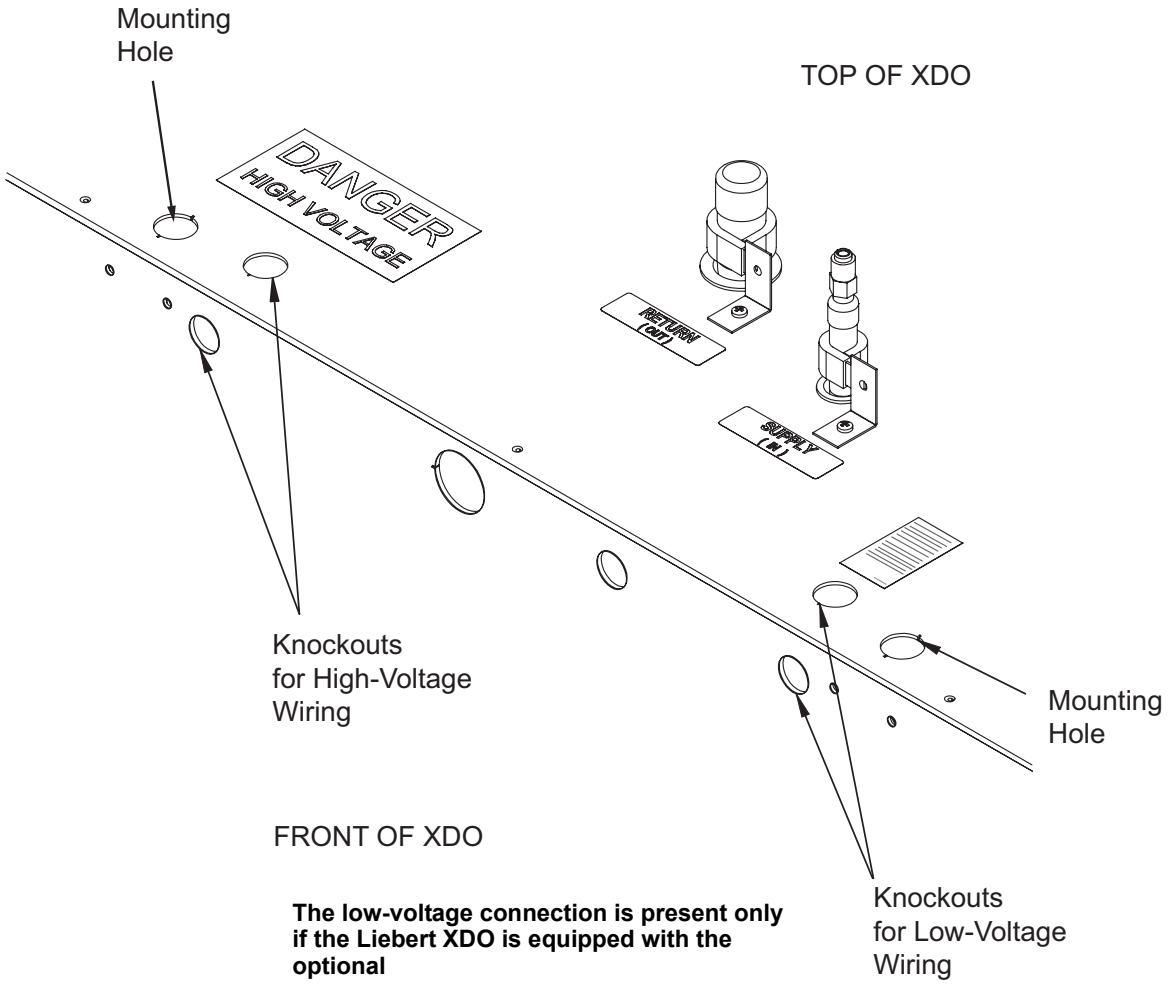


**Figure 32 Liebert XDO top and front electrical access points**




## 4.2 Liebert XDV Standard Features

- Micro Channel Heat Exchanger—The Liebert XDV unit includes one all-aluminum micro channel heat exchanger.
- Dual IEC Power Cords and Power Inlets—The Liebert 115V, 60Hz Liebert XDV unit is supplied with two detachable, 10 ft (3m) power cords that attach to two IEC power inlets in the rear of the unit. Each power cord has a NEMA 5-15P (IEC 320-C14) plug at the opposite end.

  The Liebert 230V, 60/50 Hz Liebert XDV unit is supplied with two non-detachable 10 ft (3m) power cords.

  This feature allows the unit to be powered by two separate power sources.
- Dual Air Inlets—The Liebert XDV unit can be configured to allow air to enter from the rear grille or the bottom of the unit.
- Dual Fans—Airflow is provided by two fans on the front of the unit. Dual switches—Controls on the front of the unit permit the use of one fan or both fans.
- Foundation Mounting—There are two 1/4-20 cage nuts located on the underside of unit which allow direct attachment to any Liebert Foundation cabinet, bolts provided with Liebert XDV unit.
- Mounting Clips for non-Liebert cabinets—The Liebert XDV unit is supplied with mounting clips that allow attachment to a non-Liebert cabinet (Some drilling maybe required).

### 4.2.1 Optional Features—Liebert XDV

- **Refrigerant Pre-Charge**—Liebert XDV units with the pre-charged refrigerant option will have one-shot fittings that contain pressurized refrigerant inside the Liebert XDV. The fittings ease connection to Liebert XD Piping and filling with refrigerant.
- **External Mounting Brackets**—The Liebert XDV can be suspended from the overhead building structure. The external mounting brackets are ship-loose items.
- **Field-Installed Flexible Piping** (for use with prefabricated piping assemblies)—Field-installed flexible piping kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8, 2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefabricated piping assembly is with a threaded coupler. For information on acquiring the correct kit for your installation, refer to DPN000781_Rev1, available from Liebert by calling 1-800-LIEBERT and from your local Liebert representative.
- **Condensate Detection**—The Liebert XDV unit is available with factory-installed condensate detection. The condensate detection has connection points (dry contacts) at the external rear of the unit.

**Figure 33 Liebert XDV dimensions**

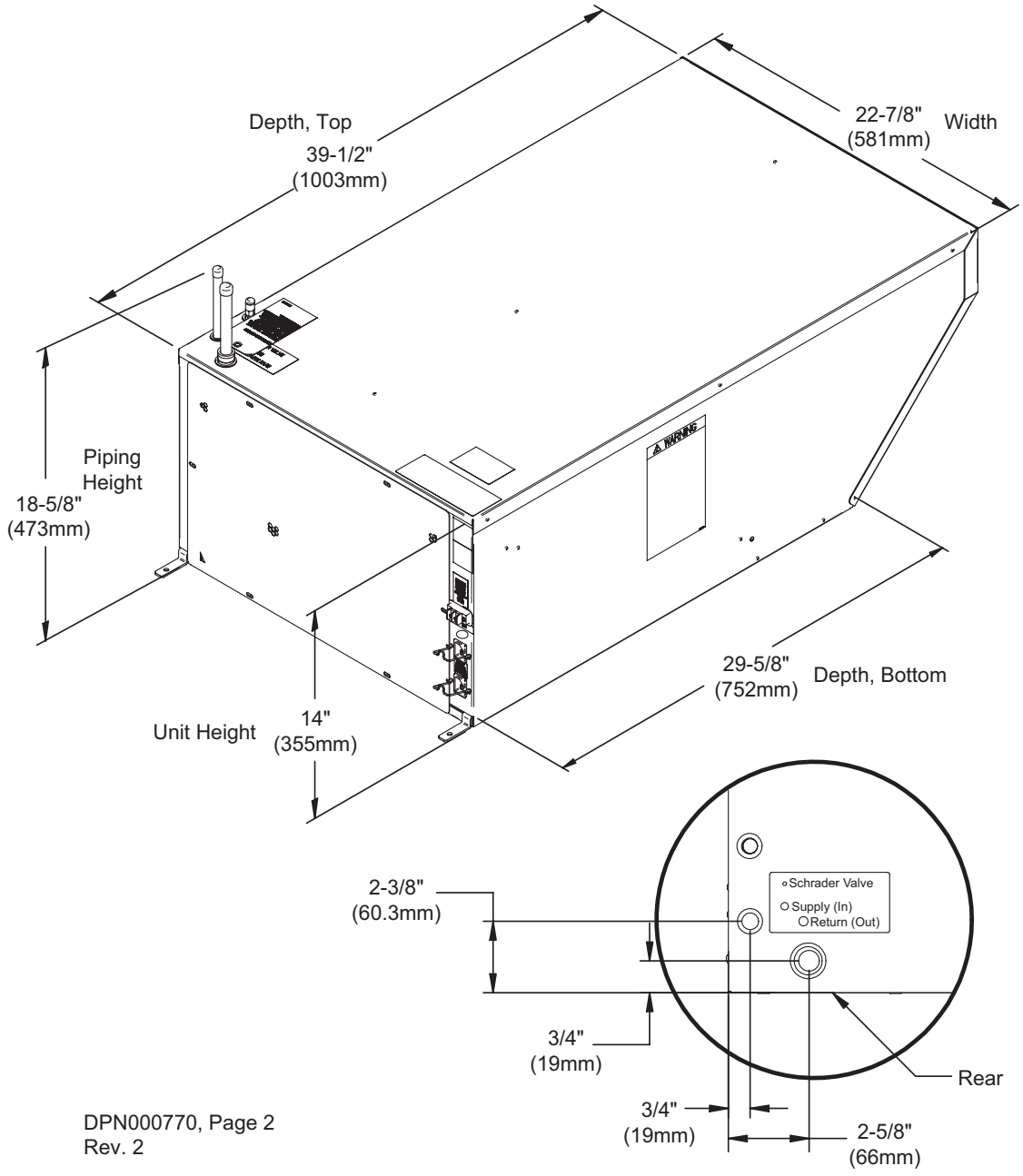


**Figure 34 Liebert XDV dimensions with one-shot connection**

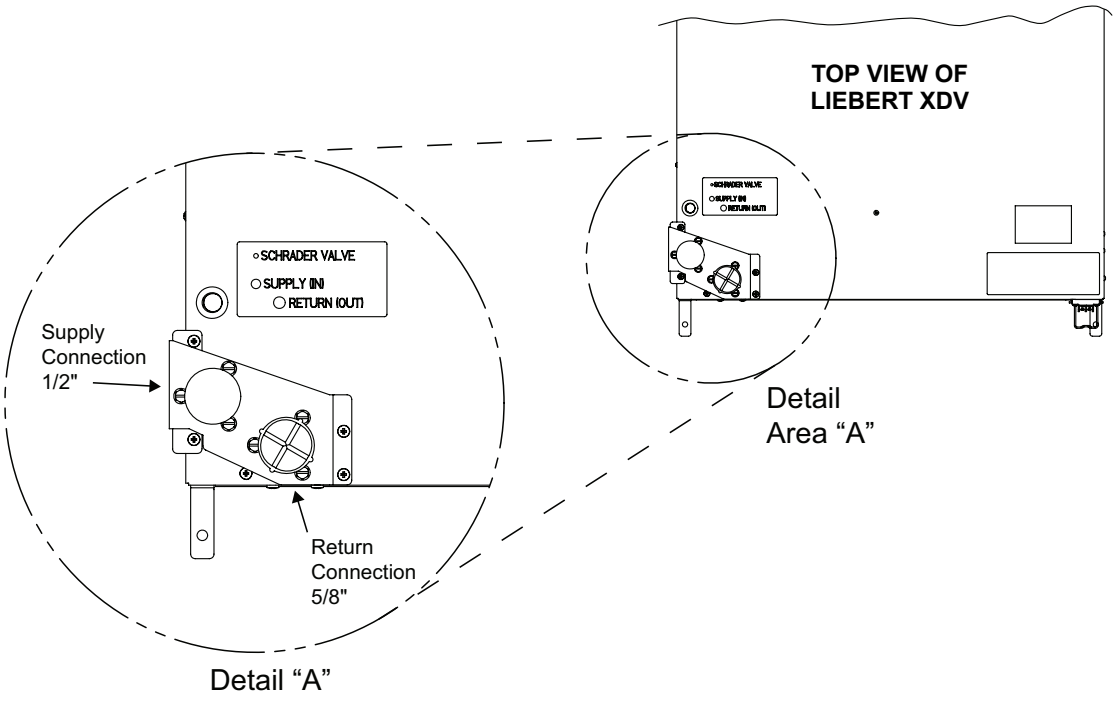


**Figure 35 Liebert XDV electrical connections for CE approved units**

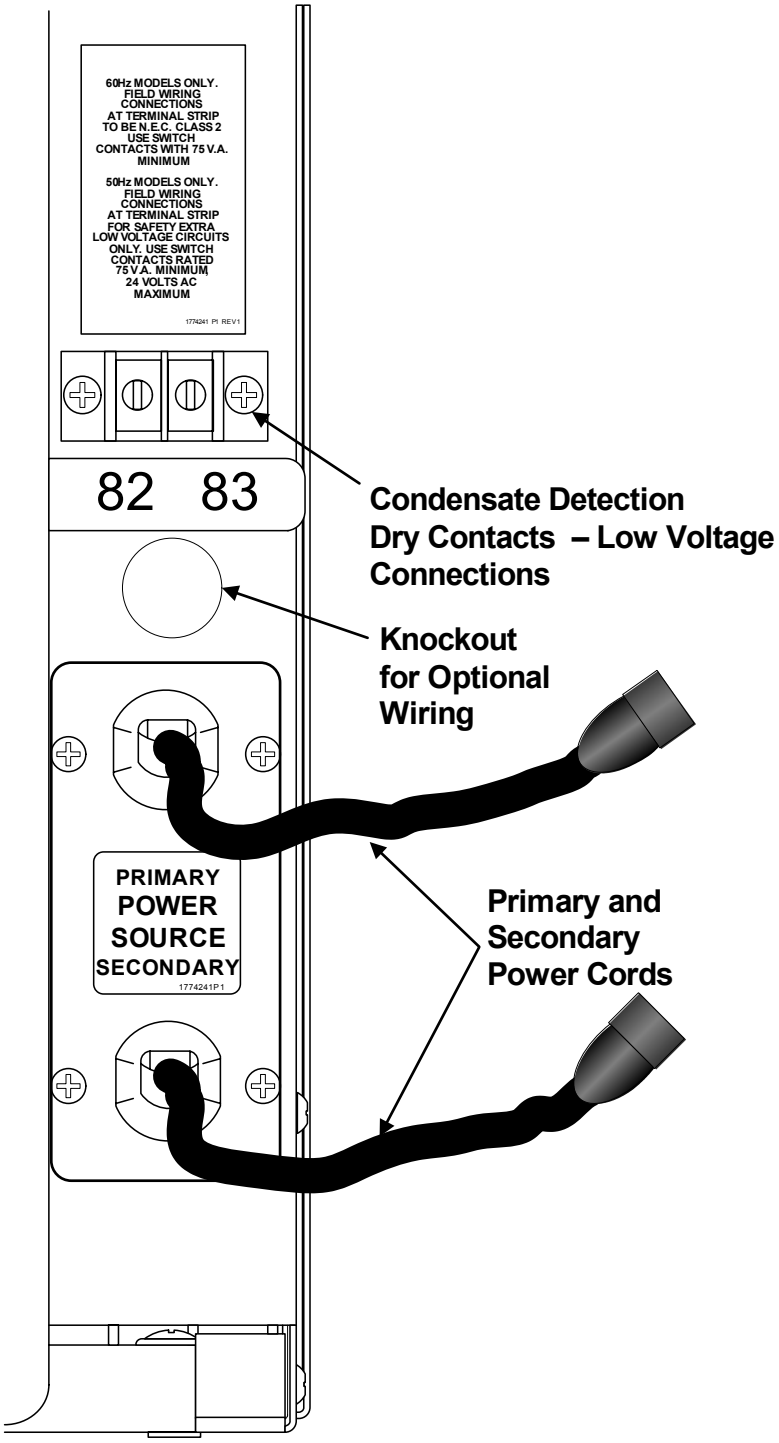


**Figure 36 Liebert XDV electrical connections for CSA-approved units**

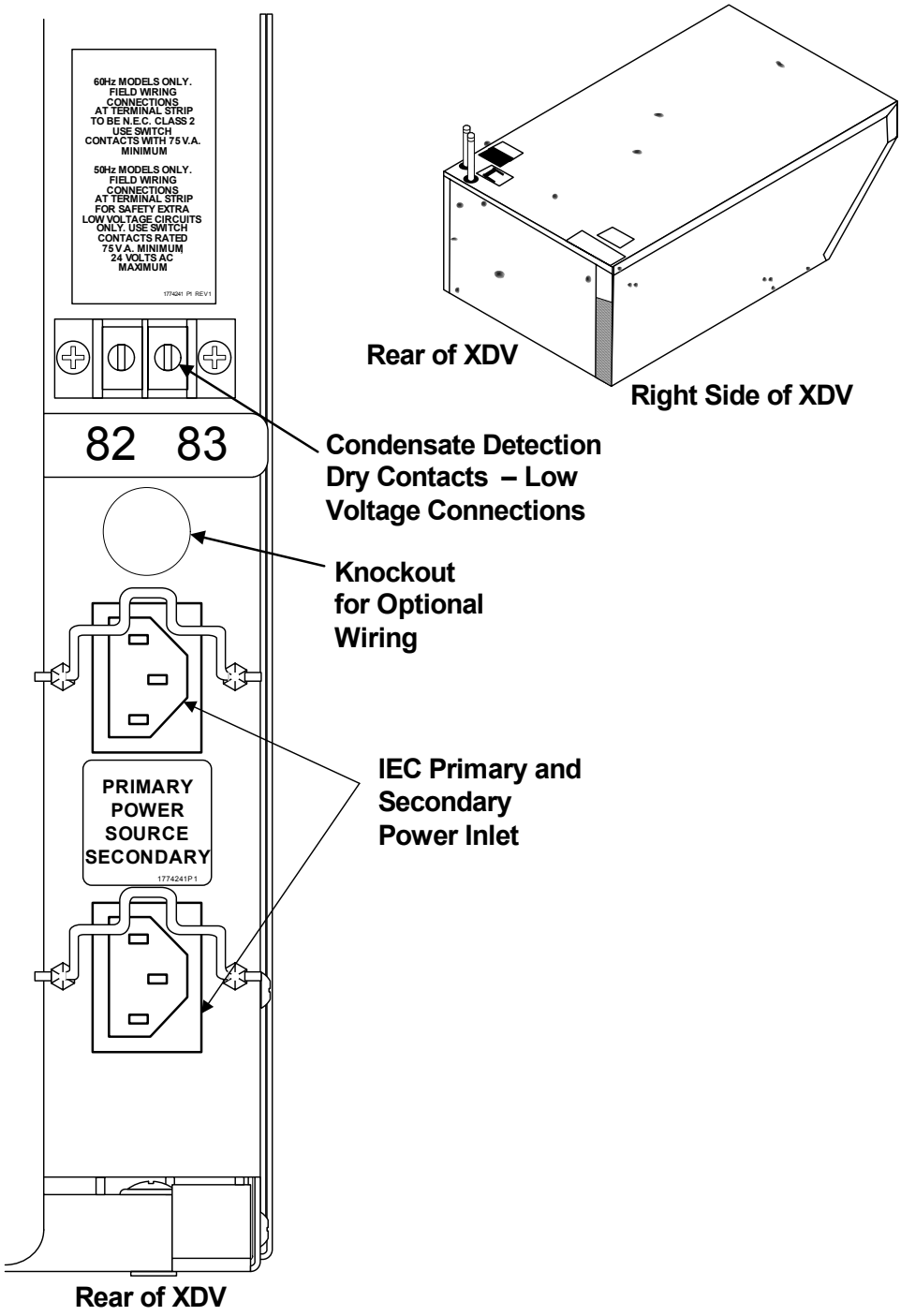


**Figure 37 Suspending single Liebert XDV from Unistruts**

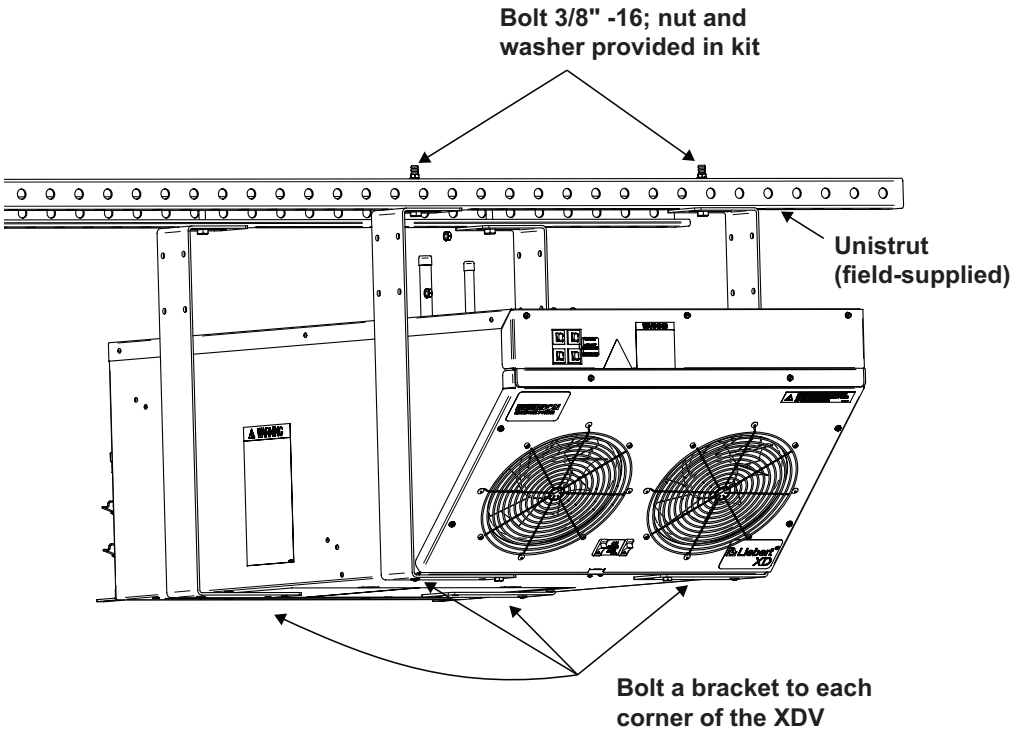



**Figure 38 Suspending single Liebert XDV from the roof structure**

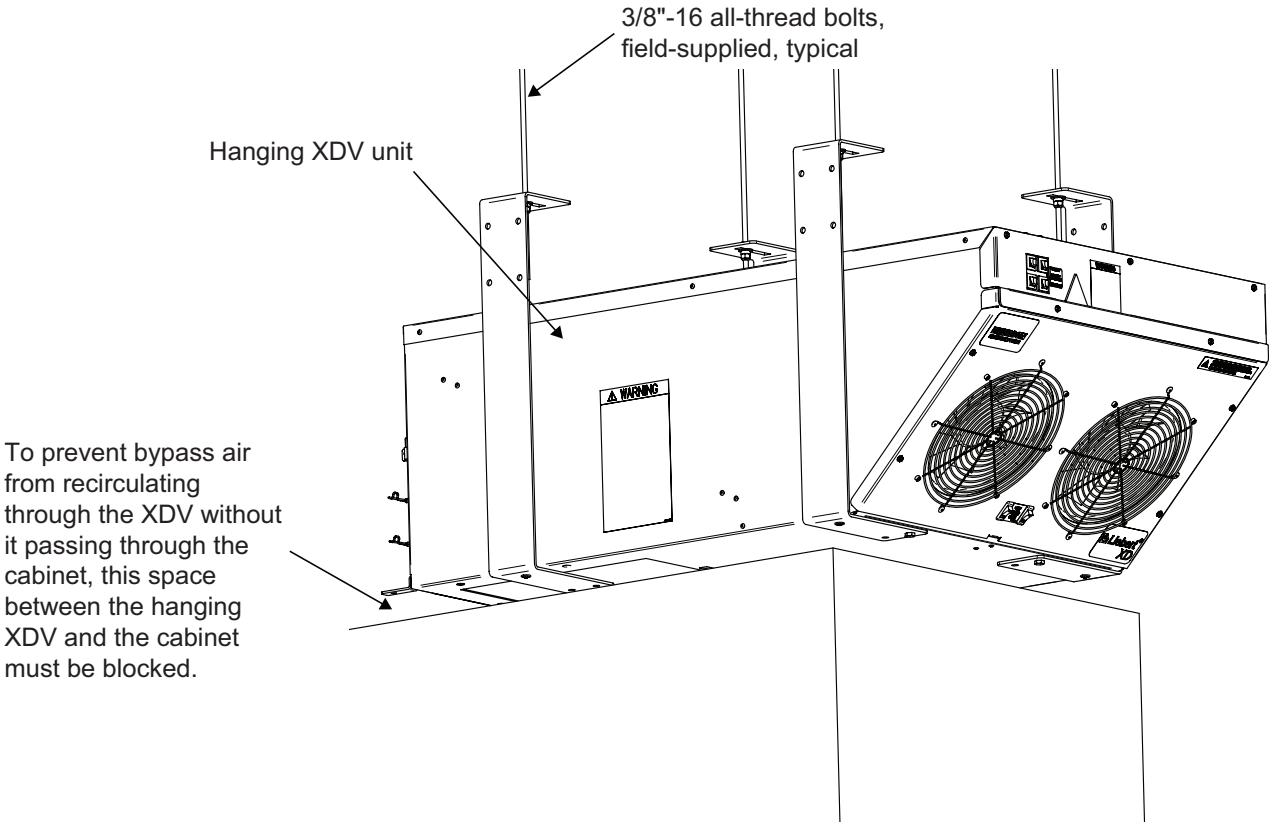
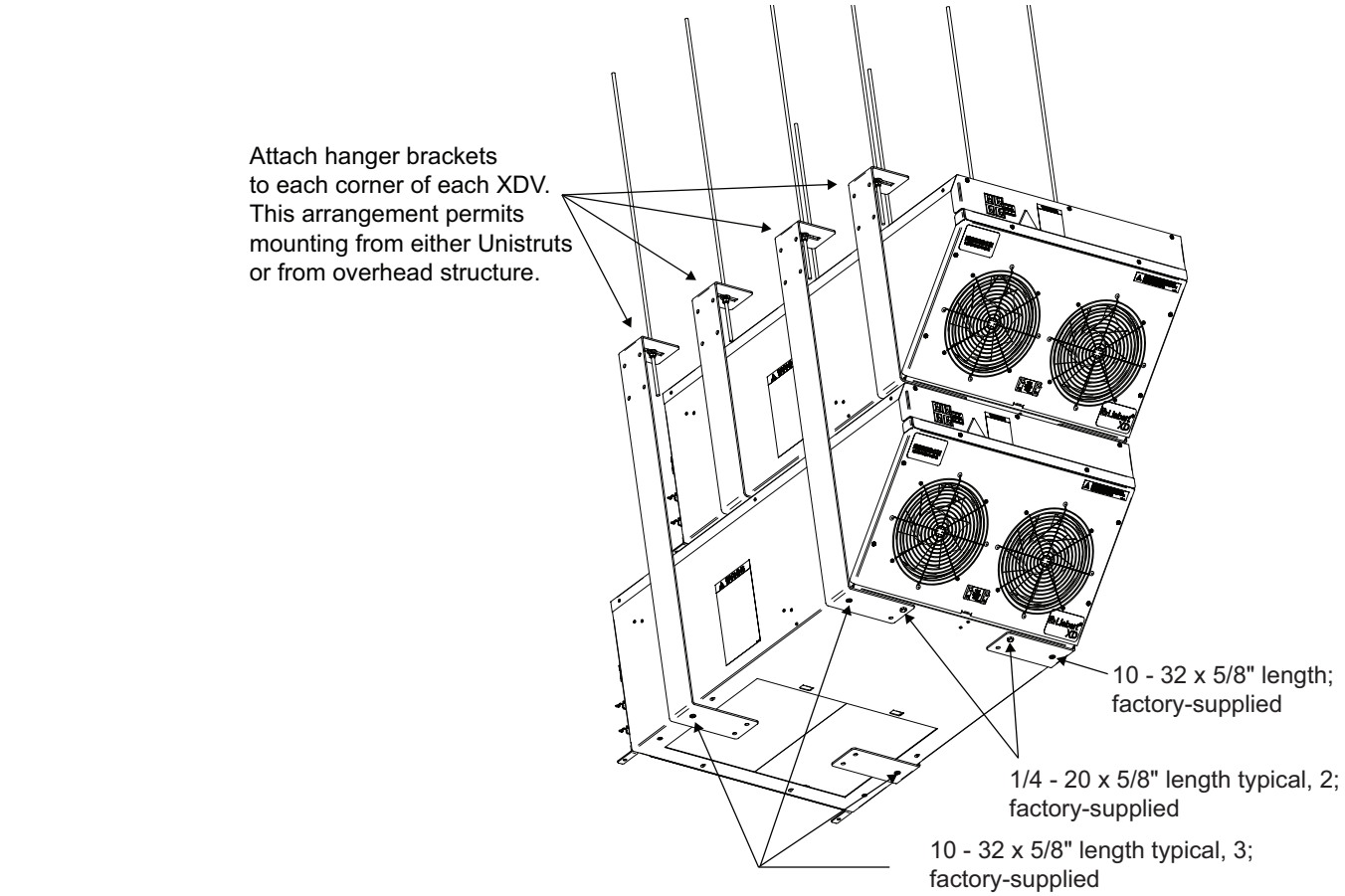


**Figure 39 Alternative mounting methods—mounting multiple Liebert XDV units**


Attach hanger brackets to each corner of each XDV. This arrangement permits mounting from either Unistruts or from overhead structure.
10 - 32 x 5/8" length; factory-supplied
1/4 - 20 x 5/8" length typical, 2; factory-supplied
10 - 32 x 5/8" length typical, 3; factory-supplied
Unistrut field-supplied upper XDV: 1 lower XDV: 2
Bolt 3/8"- 16, nut and washer factory-supplied

## 4.3 Liebert XDCF Standard Features

The Liebert XDCF is a self-contained module designed to cool Egenera's BladeFrame EX cabinets and equipment without exhausting heat into the room.

Upper and lower modules may be mounted on the rear of an Egenera BladeFrame. Liebert XDCF modules use R-134a refrigerant. When attached to a fully loaded BladeFrame EX rack, each Liebert XDCF module has a nominal cooling capacity of 10kW (2.8 tons; 34,000 BTUh). Performance is based on:

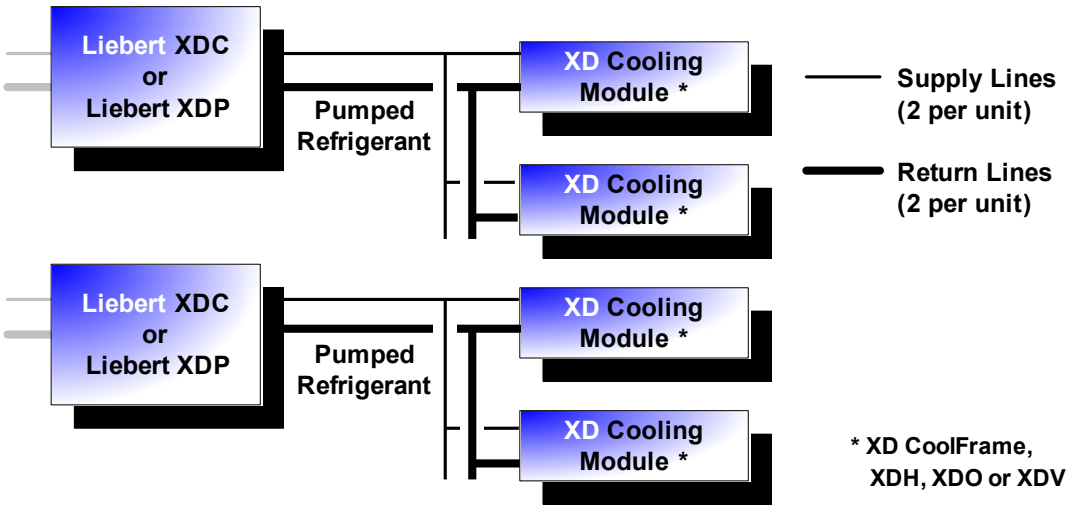
- Entering fluid temperature—55°F (12.8°C) and
- Dew point—50°F (10°C) or lower.

Liebert XDCF modules consist of a sheet-metal frame, coil and filter dryer. It has no moving parts and needs no electricity.

The Liebert XDCF system (see **Figure 40** below) consists of:

- Liebert XDCF modules—upper and lower models are available
- Flex pipe—connects Liebert XDCF units to supply and return piping
- Liebert XD Piping—delivers R-134a refrigerant through flexible piping
- Liebert XDP or Liebert XDC—supplies R-134a refrigerant to Liebert XDCF modules (see Liebert XDP or Liebert XDC user manual for required chiller or drycooler)

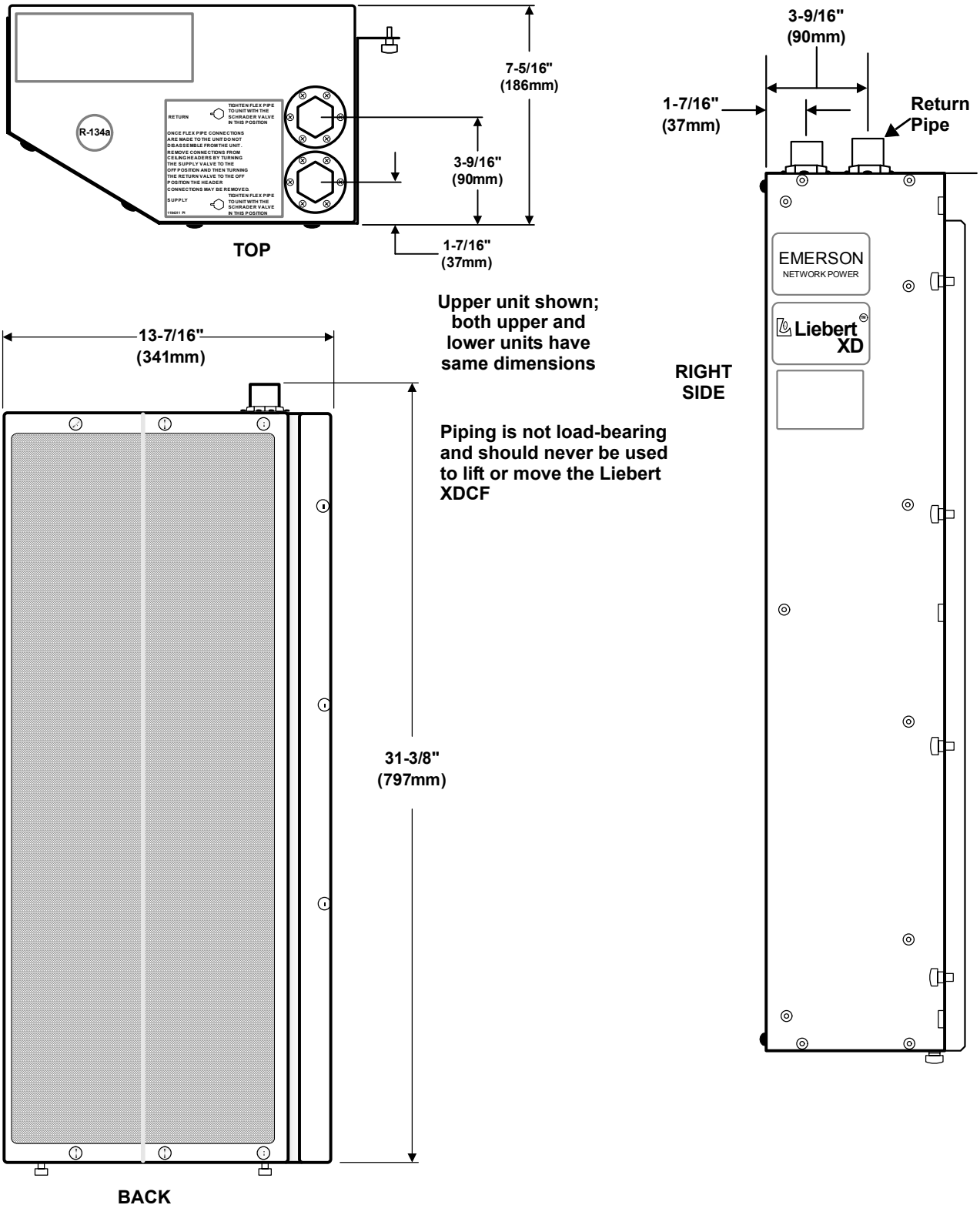
**Figure 40 Liebert XDCF hydraulic diagram**



## 4.4 Liebert XDCF Mechanical Considerations

The Liebert XDCF is engineered to fit on the rear of the Egenera BladeFrame enclosure. **Figure 41** illustrates the unit's dimensions and the location of pipes. **Figure 42** shows the attachment positions of each module.

**Figure 41 Overall dimensions**

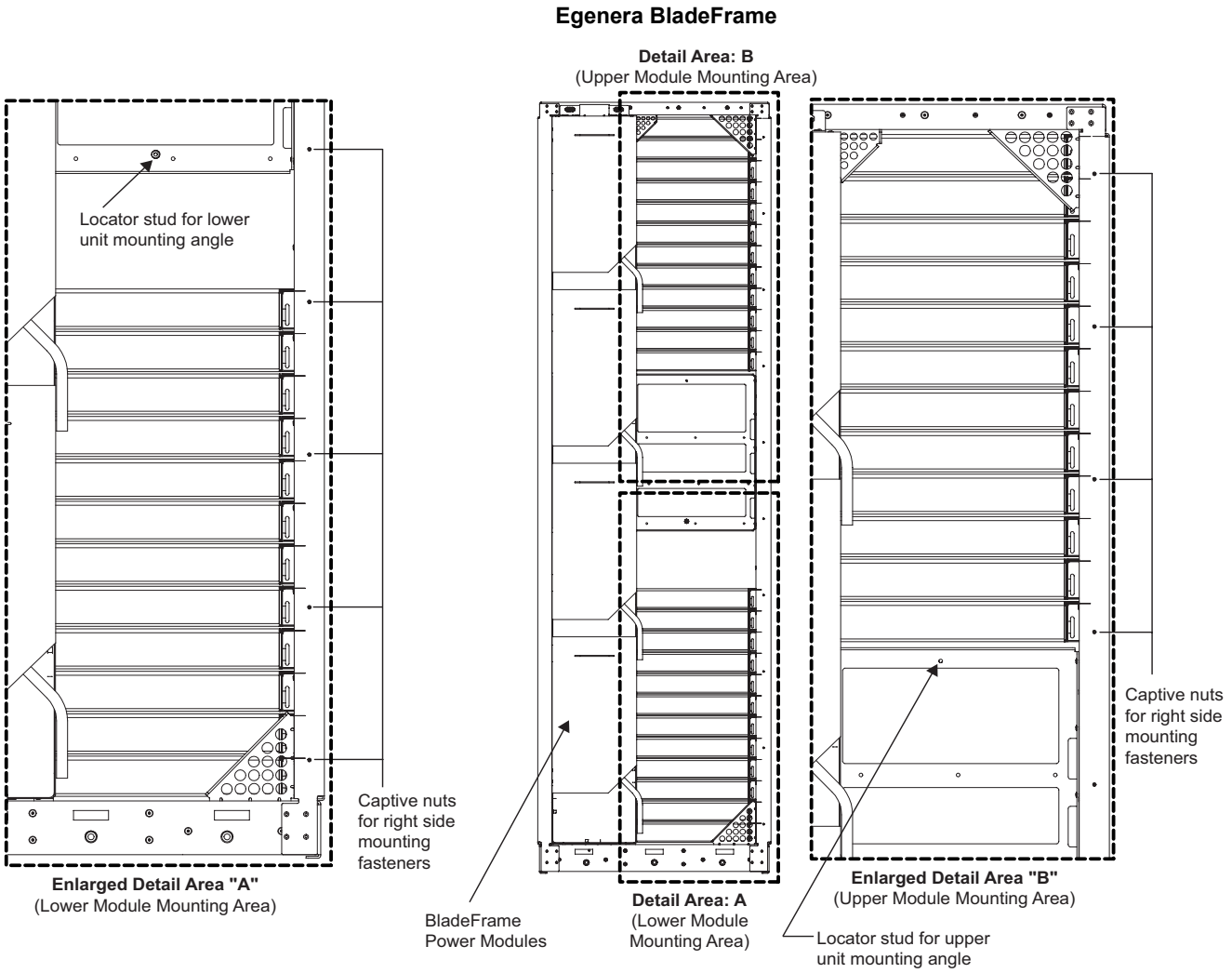


## 4.5 Liebert XDCF Installation Considerations

No cutting or drilling is required to attach the modules to the rear of the Egenera BladeFrame cabinet. All mounting holes, slots and pins required are fabricated at the factory.

Liebert XDCF modules attach beside the power modules on the rear of the Egenera BladeFrame (see **Figure 42**).

**Figure 42 Liebert XDCF unit mounting locations**


Egenera BladeFrame
Detail Area: B
(Upper Module Mounting Area)
Locator stud for lower unit mounting angle
Captive nuts for right side mounting fasteners
Enlarged Detail Area "A"
(Lower Module Mounting Area)
BladeFrame Power Modules
Detail Area: A
(Lower Module Mounting Area)
Enlarged Detail Area "B"
(Upper Module Mounting Area)
Captive nuts for right side mounting fasteners
Locator stud for upper unit mounting angle

## 4.6 Liebert XDCF Piping Connection Methods and Points

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

Supply piping connection is 1/2" OD copper pipe, and return piping connection is 5/8" OD copper. Both supply and return fittings are one-shot connections. These fittings contain pressurized R-134a refrigerant inside the Liebert XDCF.

**WARNING**

Risk of explosive discharge. Can cause death, injury and equipment damage.

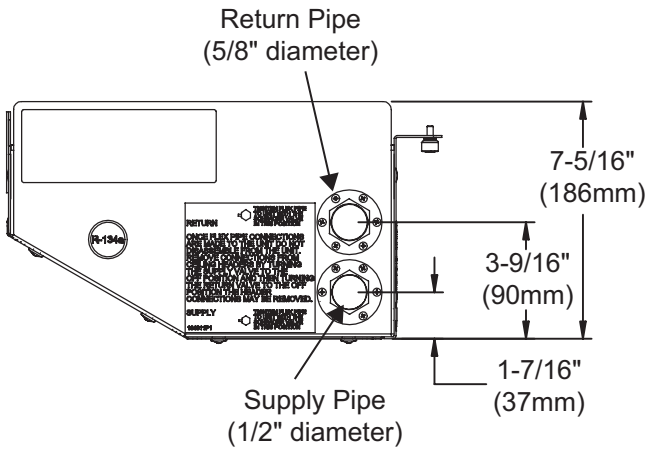
Do not disconnect one-shot connections after they have been connected. Disconnection will release pressurized R-134a refrigerant from the Liebert XDCF.

The Liebert XDCF has supply and return piping access on the top of each module.

### 4.6.1 Header System

The Liebert XDCF module system requires use of the Liebert XD prefabricated piping assembly. The prefabricated piping is compatible with the flex pipe required to attach to the Liebert XDCF modules.

**Figure 43 Liebert XDCF supply and return piping access points**




## 4.7 Liebert XDH Standard Features

- **Dual Refrigeration Circuits**—Each Liebert XDH has two refrigeration circuits, one in the upper half of the unit and one in the lower half. This increases its cooling efficiency and efficacy: Cooled air is expelled from each refrigeration circuit for better dispersal in the conditioned space. Dual refrigeration circuits permit altering cooling levels in response to server room conditions. The dual refrigeration circuits permits interlaced connection of two refrigerant sources to enhance system reliability.
- **Dual Power Cords and Power Inlets**—The Liebert XDH is supplied with two (2) detachable power cords 10 ft (3m) long that attach to two IEC power inlets on the rear of the unit. Each power cord has a NEMA 5-15P (IEC 320-C14) plug at the opposite end. The dual power cords allow the unit to be powered by two separate power sources. If the secondary power cord is connected to a UPS, the Liebert XDH unit fans will continue to operate if utility power fails.
- **Top Piping Access**—The Liebert XDH has supply and return piping access on the top of each module. Supply piping connection is 1/2" OD copper pipe, and return piping connection is 7/8" OD copper.
- **Corner Stabilizers**—A stabilizer in each corner permits rolling the Liebert XDH with greater ease and less chance of tipping.
- **Air Diffusers**—Two diffusers, one on the upper half of the unit and one on the lower half, enhance flow of cooling air. Uni-directional and bi-directional diffusers are available.

### 4.7.1 Optional Features—Liebert XDH

- **Condensate Detection**—A Liqui-tect moisture detection device and a contact-closure output are available as factory-installed options. These detect condensation in the Liebert XDH's catch pan and connect to a monitoring or alarm system. A front panel alarm and indicator alert the user to condensation inside the unit.
- **Refrigerant Pre-Charge**—Liebert XDH units with the pre-charged refrigerant option will have one-shot fittings that contain pressurized refrigerant inside the Liebert XDH. The fittings ease connection to Liebert XD Piping and filling with refrigerant.
- **Field-Installed Flexible Piping** (for use with prefabricated piping assemblies)—Field-installed flexible piping kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8, 2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefabricated piping assembly is with a threaded coupler. For information on acquiring the correct kit for your installation, refer to DPN000781_Rev1, available from Liebert by calling 1-800-LIEBERT and from your local Liebert representative.

**Figure 44 Liebert XDH dimensions**

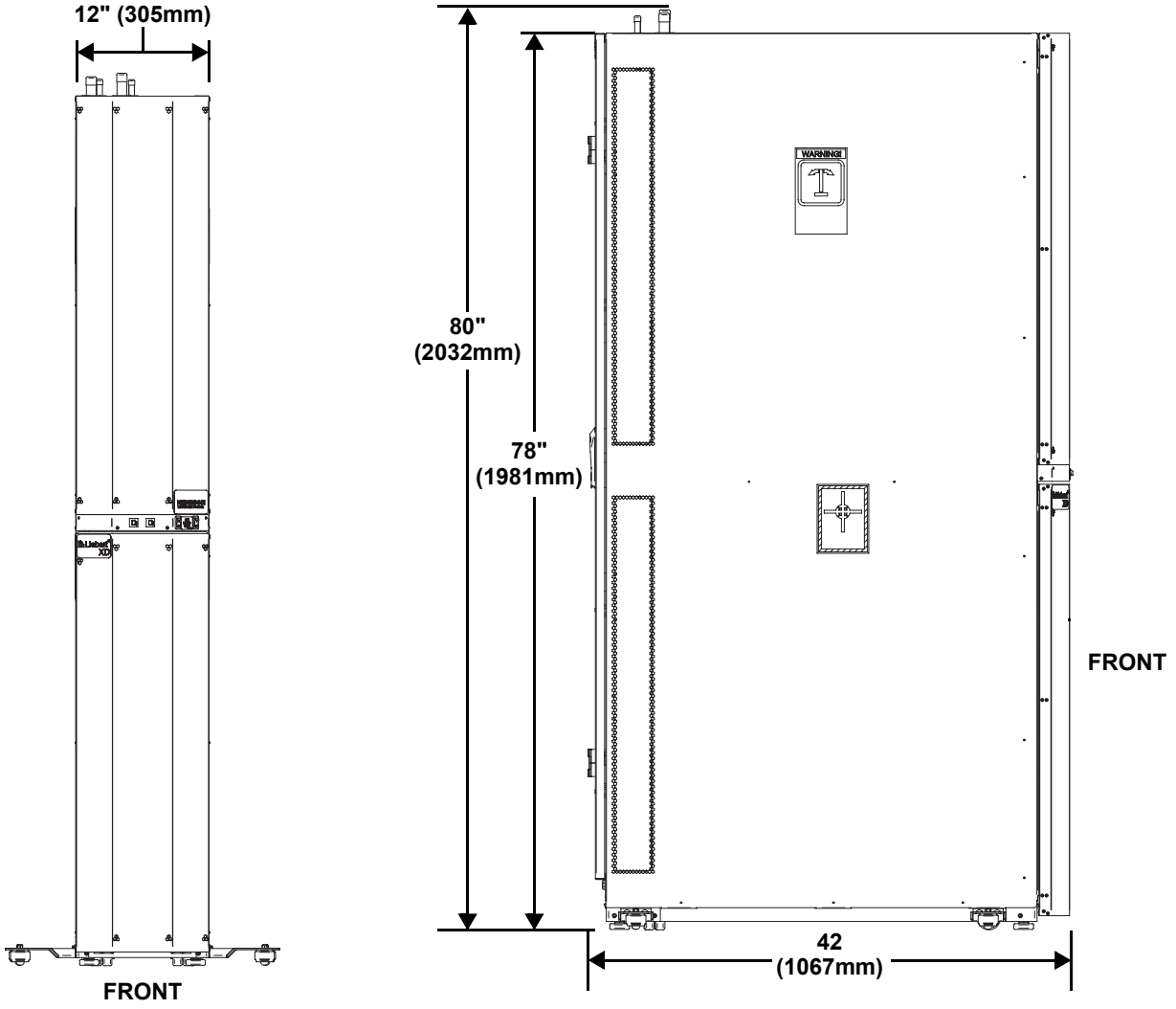
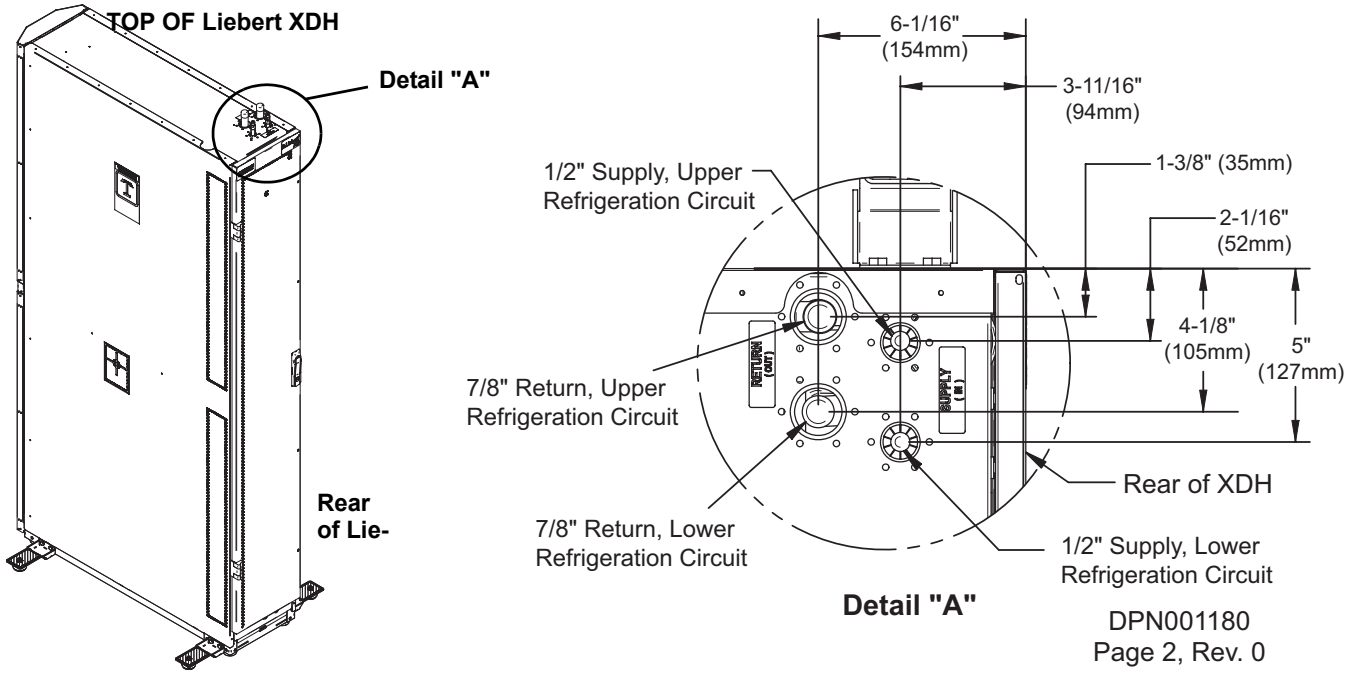



**Figure 45 Supply and return piping connections**

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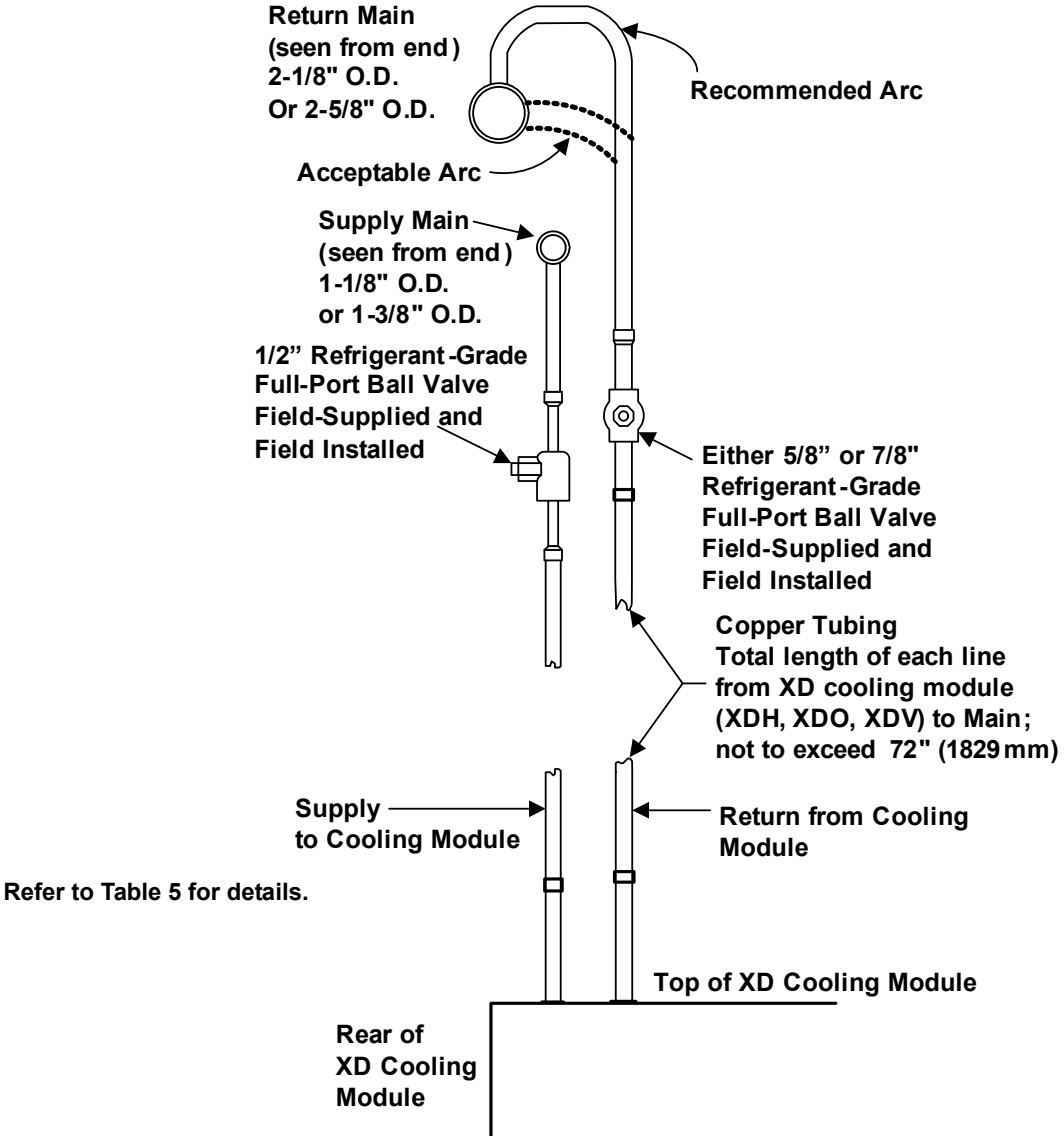
### 4.7.2 Piping Connections to Liebert XDP or Liebert XDC

#### Piping Installation for Hard Piped System

The assembly and connection means for piping in the Liebert XD system are similar to those used for conventional refrigeration systems. All piping should be installed with high-temperature brazed joints. Soft solder is not recommended. During brazing, the lines must be filled with flowing dry nitrogen to prevent excessive oxidation and scale formation inside the piping. Prevailing good refrigeration practices must be employed for piping supports, leak testing, dehydration and charging. Failure to use good system practices may result in damage to the system. Refer to the ASHRAE refrigeration handbook for general good-practice refrigeration piping.

Follow all guidelines in **3.13 - Liebert XD Piping System Design** and **3.14 - Liebert XD Piping Slope** during installation.

**Figure 46 Hard-pipe connection diagram for Liebert XDV, Liebert XDO and Liebert XDH cooling modules**



## 4.8 Liebert XD Flex Pipe Kit

Flex Pipe kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8,2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefab piping assembly is a threaded coupler. For data on acquiring the correct kit for your installation, see **Table 17**.

**Figure 47 Liebert XD Flex Pipe dimensions—straight and 90-degree connections**

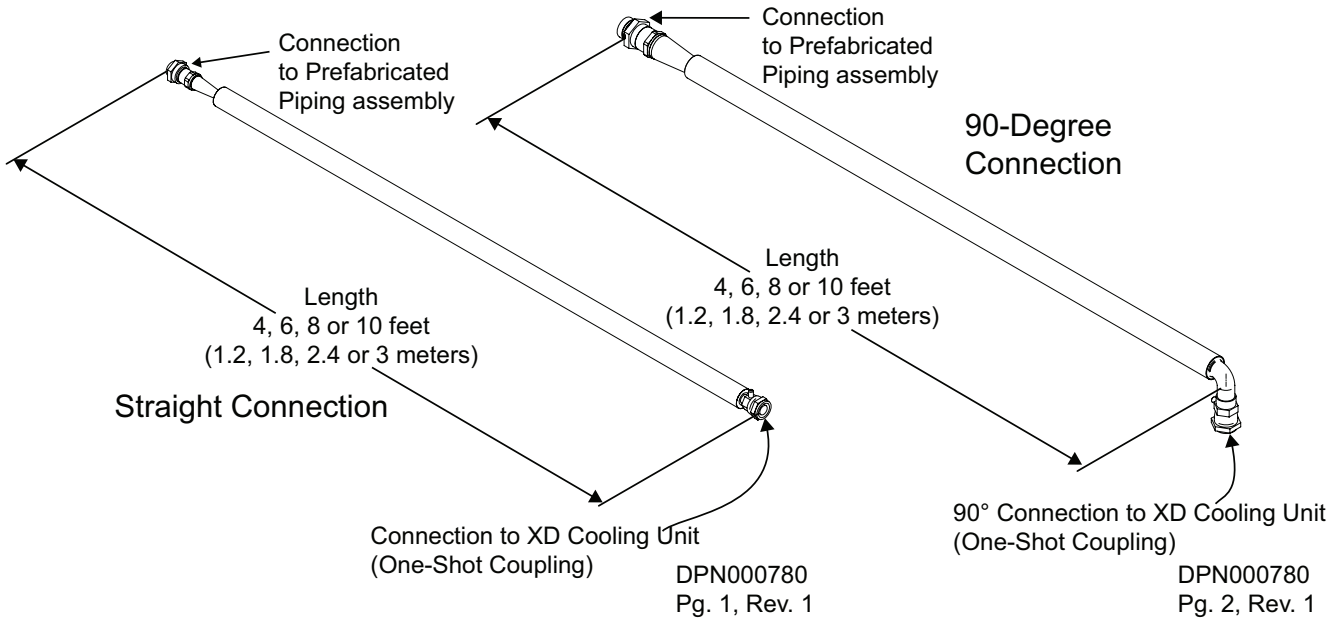



**Table 17 Liebert XD Flex Pipe assemblies, supply and return**

| Description | Liebert P/N Straight Connection Assembly | Liebert P/N 90-Degree Connection Assembly | Length ft (m) | Minimum Bend Radius [1] inches (mm) | |
|---|---|---|---|---|---|
| | | | | Supply | Return |
| Liebert XD Flex Pipe Kit Liebert XDO and Liebert XDH | 186566G1 | 186565G1 | 6 (1.8) | 7 (178) | 9 (229) |
| | 186566G2 | 186565G2 | 10 (3.0) | | |
| | 186566G3 | 186565G3 | 8 (2.5) | | |
| | 186566G4 | 186565G4 | 4 (1.2) | | |
| Liebert XD Flex Pipe Kit Liebert XDV and Liebert XDCF | 186568G1 | 186567G1 | 6 (1.8) | 7 (178) | 8 (203) |
| | 186568G2 | 186567G2 | 10 (3.0) | | |
| | 186568G3 | 186567G3 | 8 (2.5) | | |
| | 186568G4 | 186567G4 | 4 (1.2) | | |

1. The minimum bend radius is for the flexible portion of the Liebert XD Flex Pipe. Because a section of hard pipe is at each end of the Liebert XD Flex Pipe, the minimum bend radius can be larger.

## 4.9 Liebert XD Piping Dimensions and Features

### 4.9.1 Piping Installation Method prefabricated headers

The assembly and connection means used for piping in the Liebert XD system are similar to those used for conventional refrigeration systems. All piping should be installed with high-temperature brazed joints. Soft solder is not recommended. During brazing, the lines must be filled with flowing dry nitrogen to prevent excessive oxidation and scale formation inside the piping. Prevailing good refrigeration practices must be employed for piping supports, leak testing, dehydration and charging. Failure to use good system practices may result in damage to the system. Refer to the ASHRAE refrigeration handbook for general good-practice refrigeration piping.

Follow all guidelines in **3.13 - Liebert XD Piping System Design** and **3.14 - Liebert XD Piping Slope** during installation.

**Figure 48 Two-port prefabricated piping for Liebert XD cooling modules**

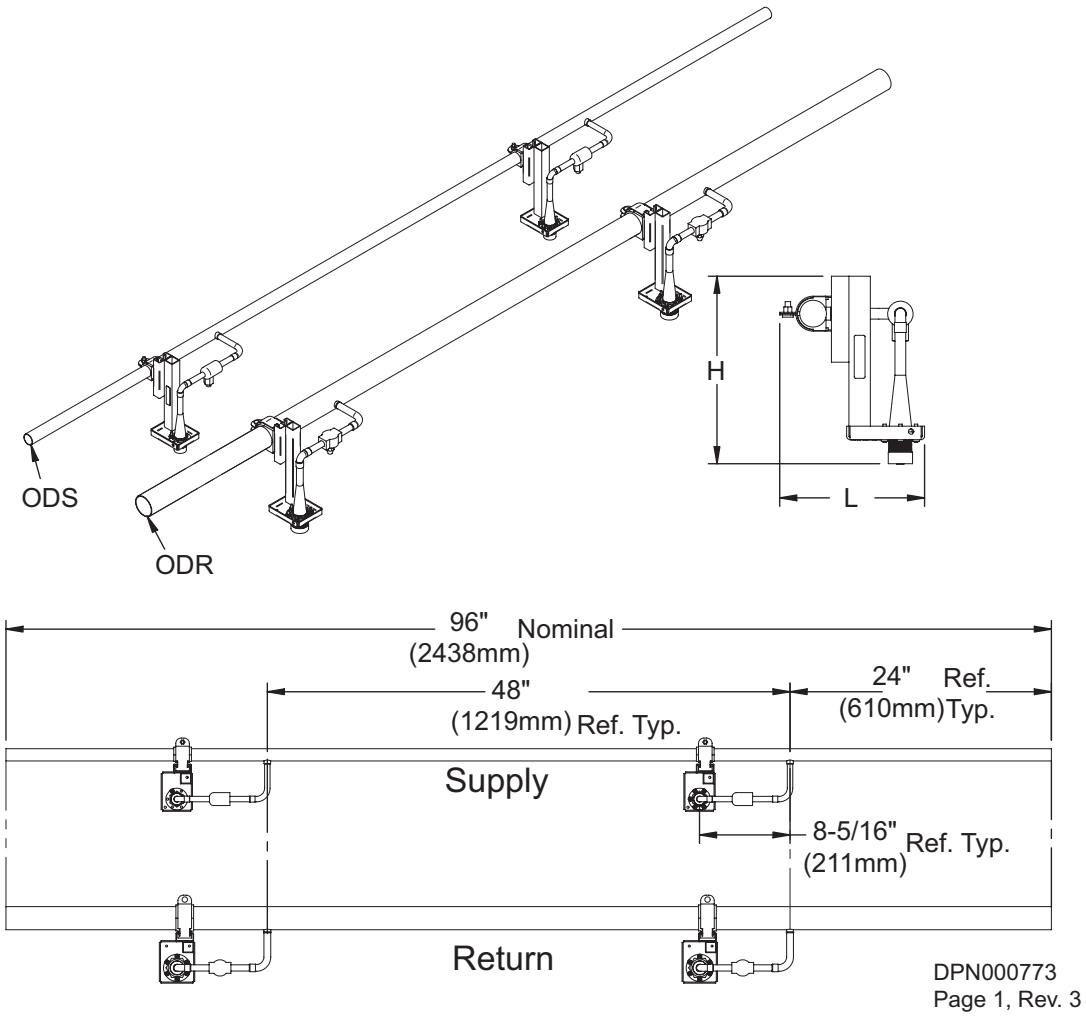



**Table 18 Two-port prefabricated piping legend**

| Branch Piping | | Standard Run | Long Run * |
|---|---|---|---|
| Two Port | | 185797G21 | 185800G21 |
| Supply inch (mm) | Outside Diameter (ODS) | 1-1/8 | 1-3/8 |
| | Height (H) | 8-3/4 (222) | 8-3/4 (222) |
| | Length (L) | 6-3/4 (171) | 6-7/8 (175) |
| Return inch (mm) | Outside Diameter (ODR) | 2-1/8 | 2-5/8 |
| | Height (H) | 10-1/2 (267) | 10-1/2 (267) |
| | Length (L) | 8-3/4 (222) | 9-1/8 (232) |

* Pipe runs greater than 60 equivalent feet

**Figure 49 Four-port prefabricated piping for Liebert XD cooling modules**

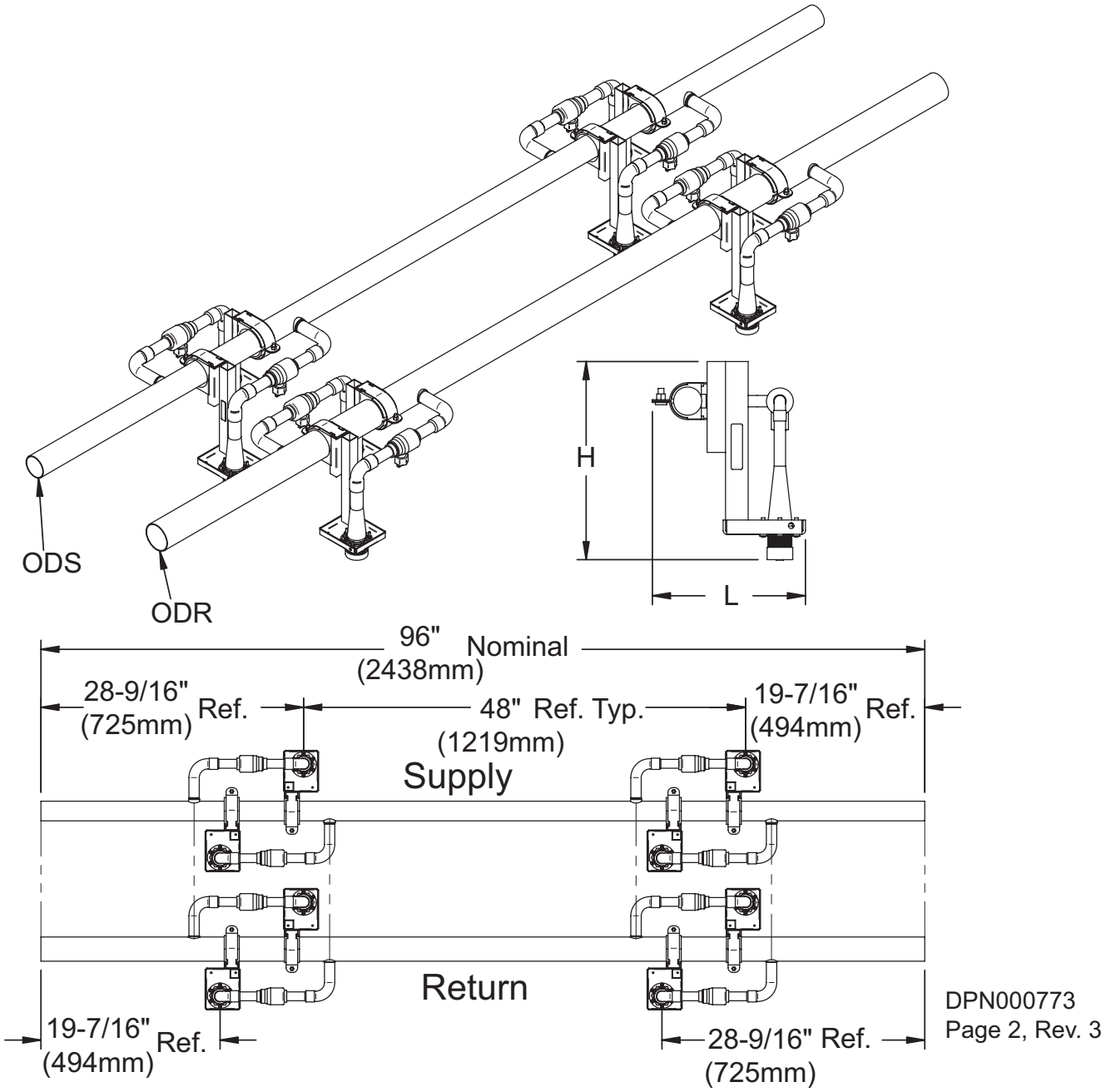



**Table 19 Four-port prefabricated piping legend**

| Branch Piping | | Standard Run | Long Run * |
|---|---|---|---|
| Four Port | | 186551G21 | 186552G21 |
| Supply inch (mm) | Outside Diameter (ODS) | 1-1/8 | 1-3/8 |
| | Height (H) | 8-3/4 (222) | 8-3/4 (222) |
| | Length (L) | 6-3/4 (171) | 6-7/8 (175) |
| Return inch (mm) | Outside Diameter (ODR) | 2-1/8 | 2-5/8 |
| | Height (H) | 10-1/2 (267) | 10-1/2 (267) |
| | Length (L) | 8-3/4 (222) | 9-1/8 (232) |

* Pipe runs greater than 60 equivalent feet

**Figure 50 Five-port prefabricated piping for Liebert XD cooling modules**

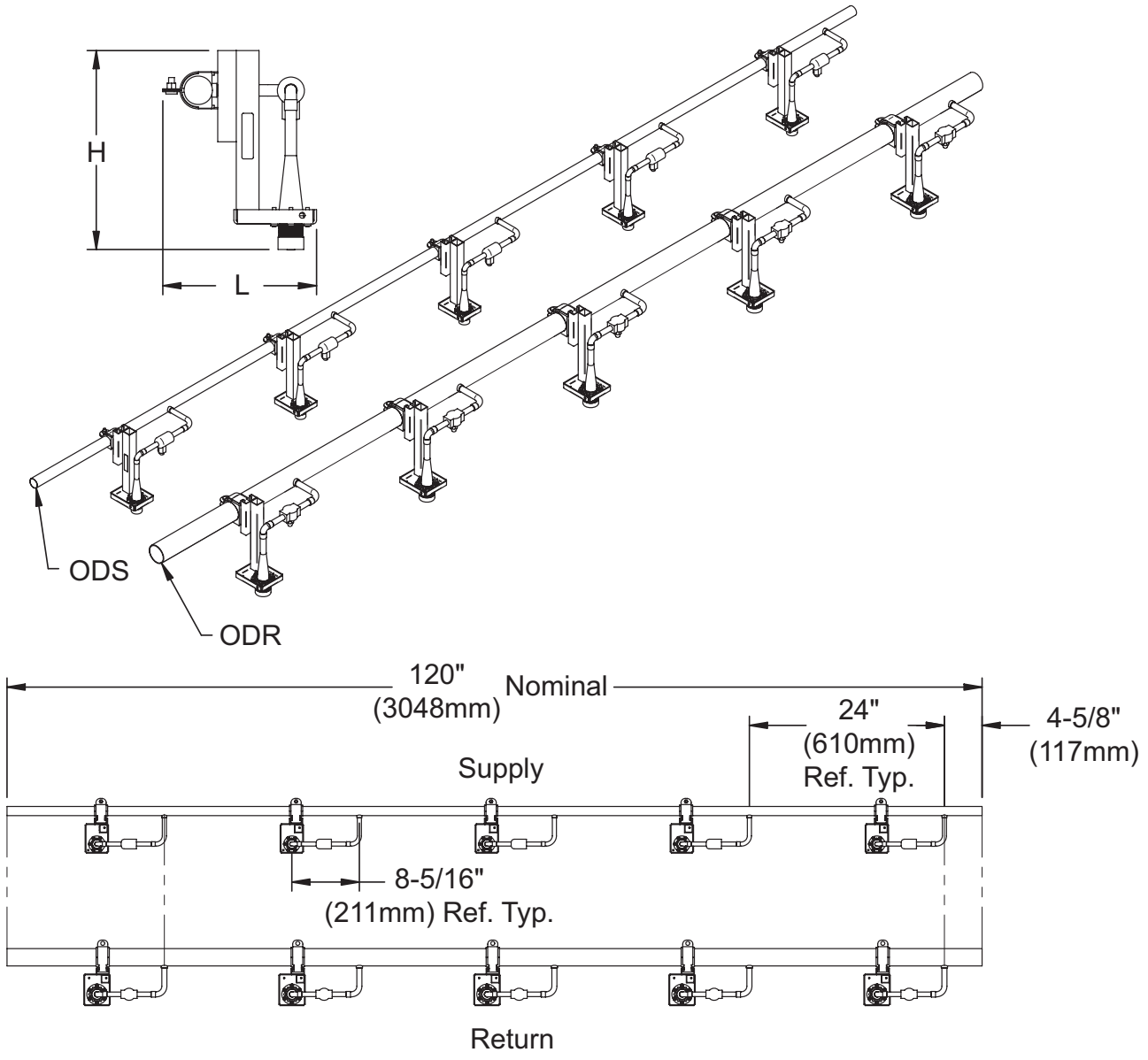



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**Table 20 Five-port prefabricated piping legend**

| Branch Piping | | Standard Run | Long Run * |
|---|---|---|---|
| Five Port | | 185797G51 | 185800G51 |
| Supply inch (mm) | Outside Diameter (ODS) | 1-1/8 | 1-3/8 |
| | Height (H) | 8-3/4 (222) | 8-1/2 (216) |
| | Length (L) | 6-3/4 (171) | 7 (178) |
| Return inch (mm) | Outside Diameter (ODR) | 2-1/8 | 2-5/8 |
| | Height (H) | 10-1/2 (267) | 10-1/2 (267) |
| | Length (L) | 8-3/4 (222) | 9-1/8 (232) |

* Pipe runs greater than 60 equivalent feet

**Figure 51 Ten-port prefabricated piping for Liebert XD cooling modules**

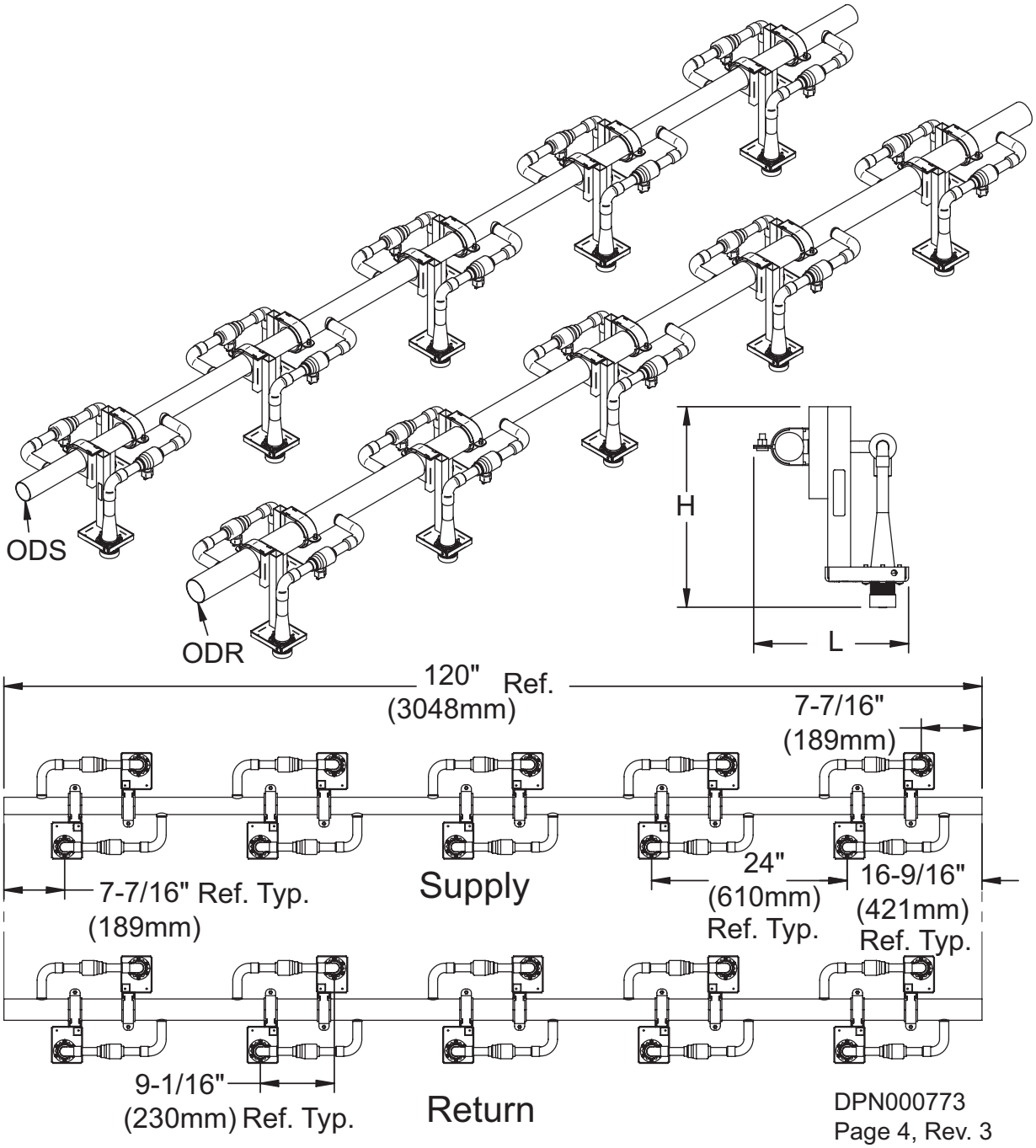



**Table 21 Ten-port prefabricated piping legend**

| Branch Piping | | Standard Run | Long Run * |
|---|---|---|---|
| Ten Port | | 186650G51 | 186553G51 |
| Supply inch (mm) | Outside Diameter (ODS) | 1-1/8 | 1-3/8 |
| | Height (H) | 8-3/4 (222) | 8-3/4 (222) |
| | Length (L) | 6-3/4 (171) | 6-7/8 (175) |
| Return inch (mm) | Outside Diameter (ODR) | 2-1/8 | 2-5/8 |
| | Height (H) | 10-1/2 (267) | 10-1/2 (267) |
| | Length (L) | 8-3/4 (222) | 9-1/8 (232) |

* Pipe runs greater than 60 equivalent feet

## 4.10 Liebert XDP Standard Features

- Heat Exchanger—Brazed plate design with interwoven circuiting constructed of stainless steel plates, copper brazed.
- Pumps—Centrifugal type, end suction, internally cooled, canned rotor design.
- Standard Control Processor—The standard control system is microprocessor-based with an external LCD numerical display to allow observation of specified adjustable functions. Operating conditions and status are indicated on the LCD panel, which is mounted either on the unit or on the wall, depending on application details (see user manual, SL-16641). The control system also monitors unit operation and activates an alarm when any of the specified factory preset conditions are exceeded.
- Cabinet and Frame—Custom powder painted steel panels. A hinged control access panel opens to a second front panel, which is a protected enclosure for all high voltage components. Frame is constructed of 14 gauge heliarc welded tubular steel and painted using an auto-deposition coating system.

**Figure 52 Liebert XDP dimensions**

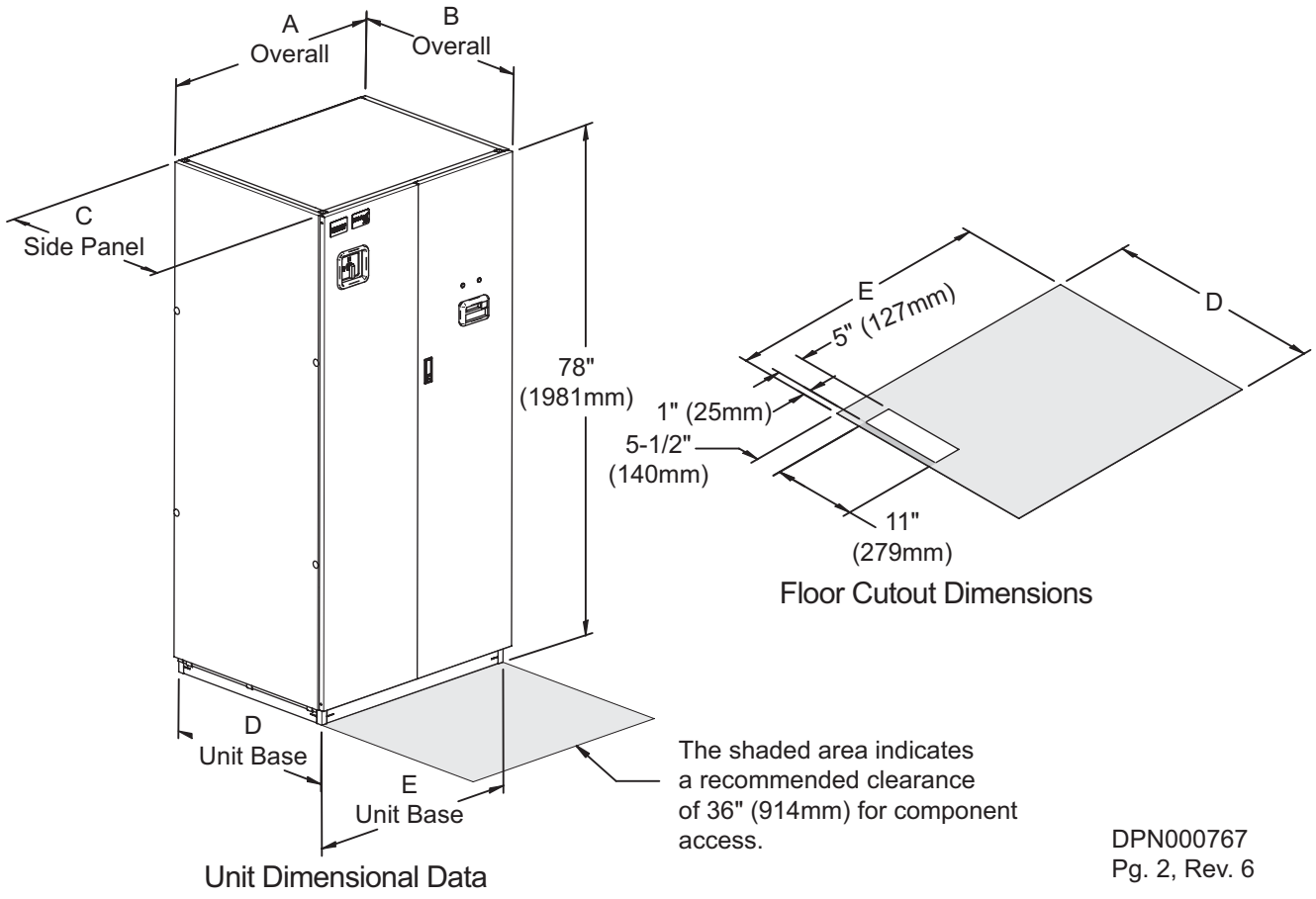
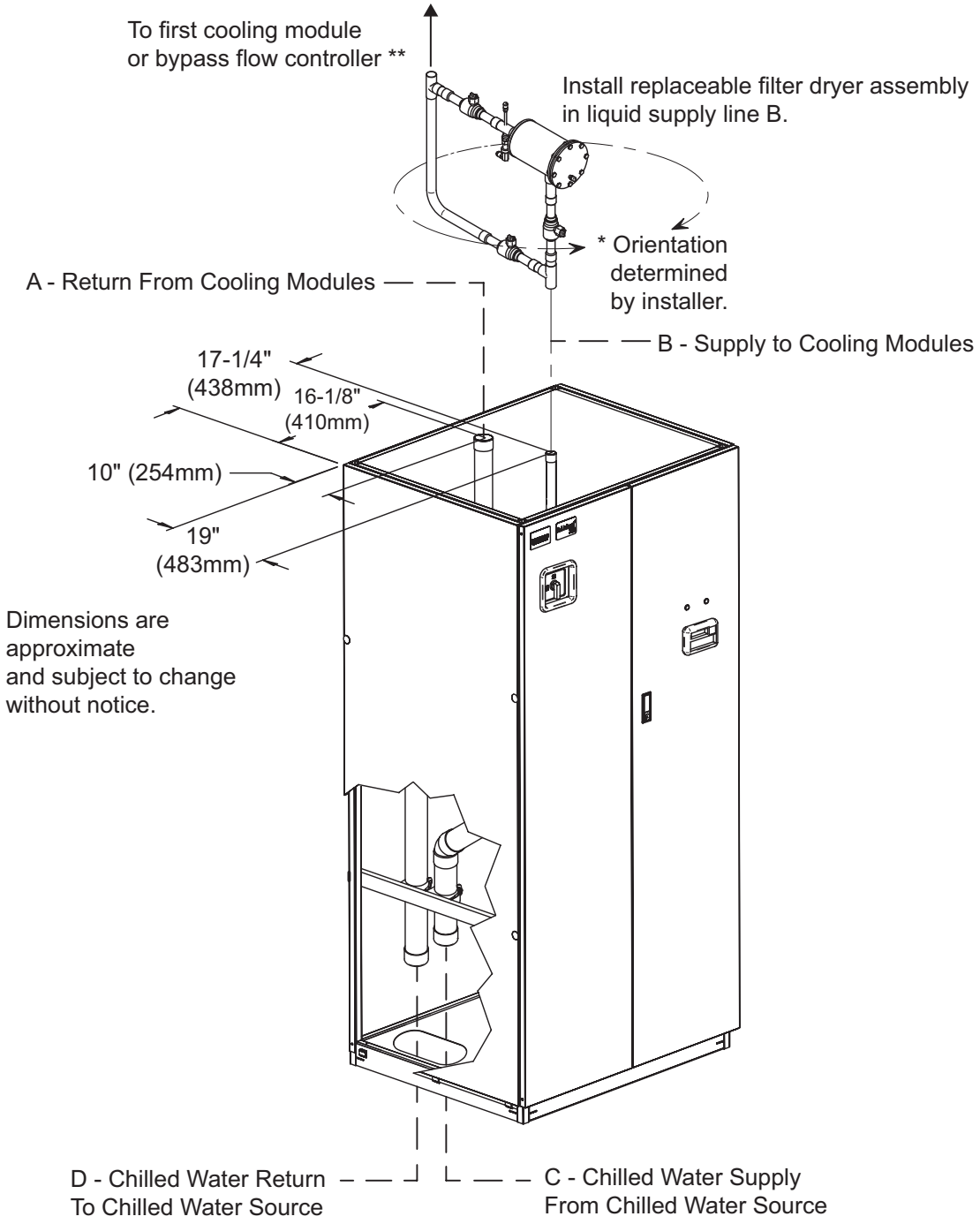



**Table 22 Liebert XDP dimensions**

| Model 50/60Hz | Dimensional Data inches (mm) | | | | | Shipping Weight, lb (kg) | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | Domestic | Export |
| Liebert XDP160 | 38 (965) | 34 (864) | 33-1/8 (841) | 33 (838) | 36 (914) | 990 (449) | 1067 (484) |

* The dimension does not include the bezel of the disconnect switch.

**Figure 53 Liebert XDP piping access points and external features**




* Allow 8" (204mm) clearance for filter replacement.
** To ensure ensure all refrigerant flow is filtered, install the filter dryer assembly between the discharge line of the XDP and the first bypass flow controller or the first cooling module.

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**Table 23 Unit piping outlet connection sizes, inches, OD Cu**

| Model | Pipe Connection Point | | | |
|---|---|---|---|---|
| 50/60 HZ | A | B | C | D |
| Liebert XDP160 | 2-1/8 | 1-1/8 | 2-5/8 | 2-5/8 |

**Figure 54 Front view of Liebert XDP and electrical enclosure**

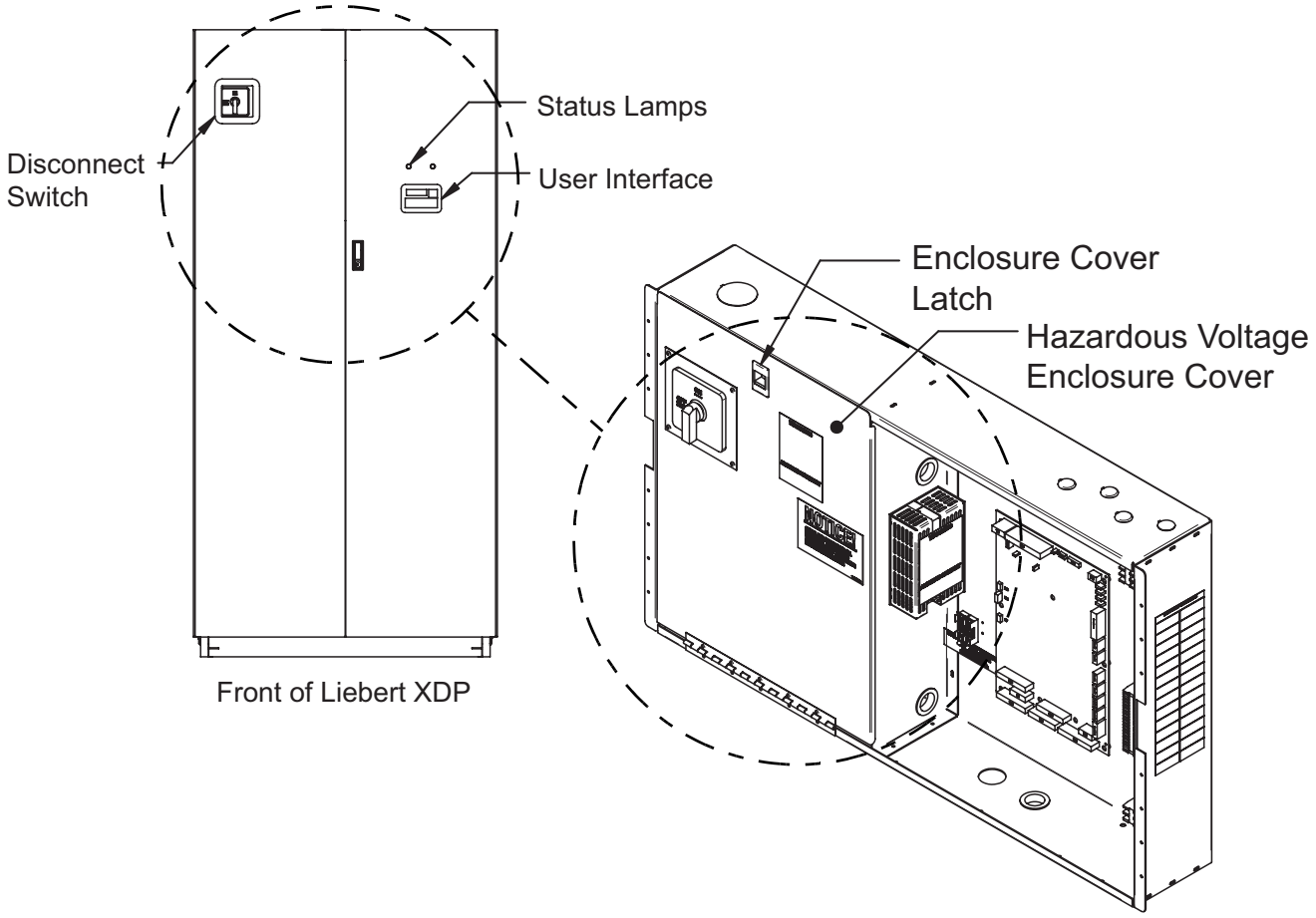



**Figure 55 Liebert XDP electrical enclosure knockout locations for field wiring**

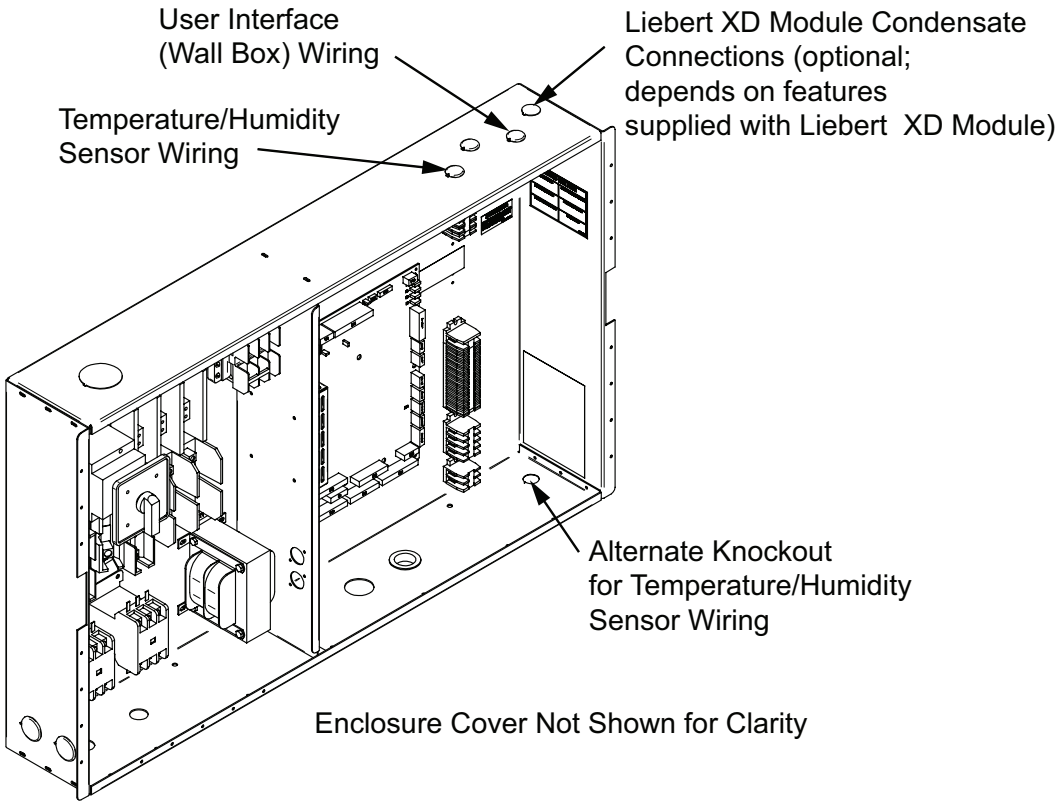

User Interface (Wall Box) Wiring
Liebert XD Module Condensate Connections (optional; depends on features supplied with Liebert XD Module)
Temperature/Humidity Sensor Wiring
Alternate Knockout for Temperature/Humidity Sensor Wiring
Enclosure Cover Not Shown for Clarity

**Figure 56 Liebert XDP 60Hz high voltage connections**

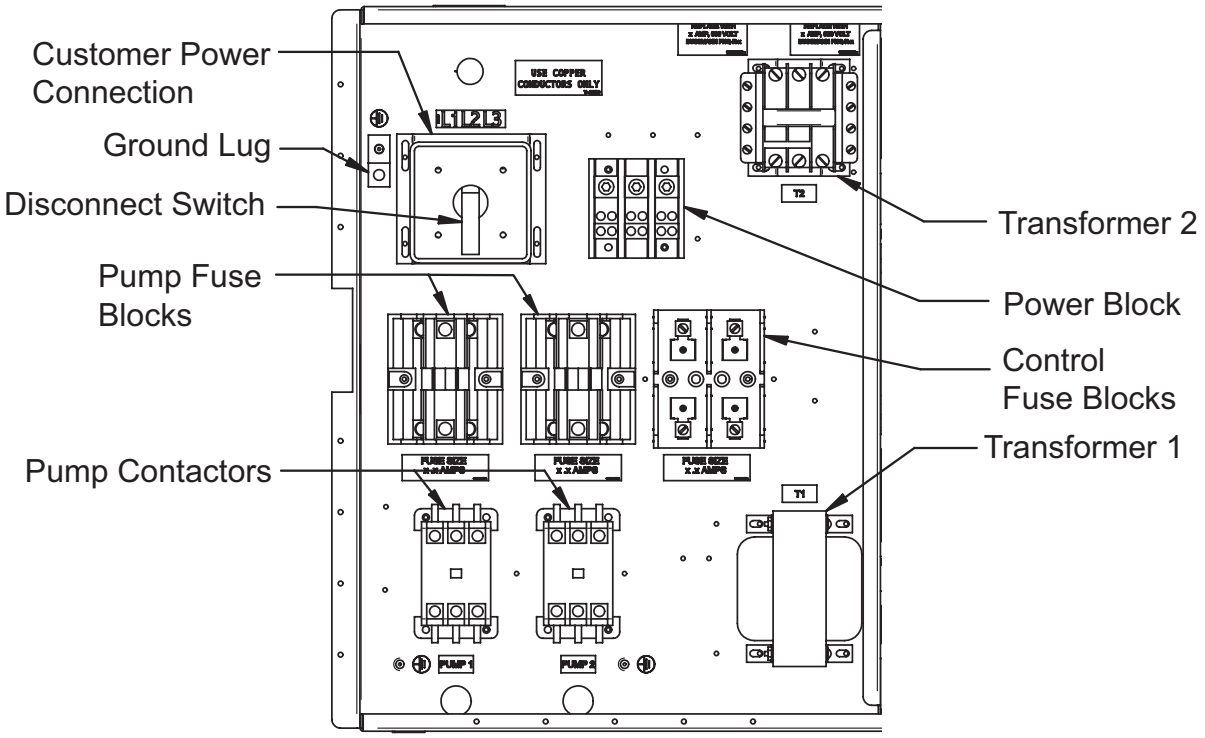
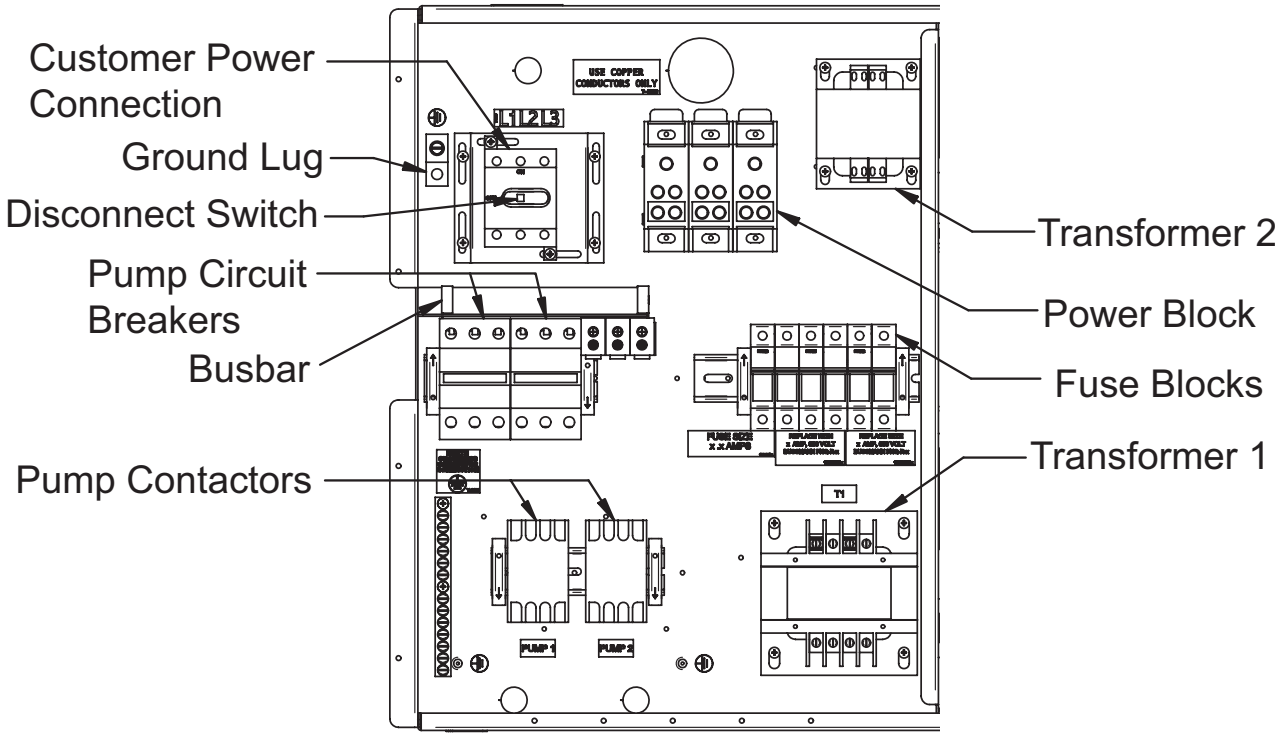



**Figure 57 Liebert XDP 50Hz high voltage connections**



## 4.11 Liebert XDC Standard Features

- Compressors—Scroll with a suction gas cooled motor, vibration isolators, thermal overloads, manual reset high-pressure switch and pump down low-pressure switch.
- Refrigeration System—Dual refrigeration circuits each including liquid line filter dryers, refrigerant sight glass with moisture indicator, electronic control valve, adjustable externally equalized expansion valves and liquid line solenoid valves.
- Heat Exchanger—Brazed plate design with interwoven circuiting constructed of stainless steel plates, copper brazed. PUMPS Centrifugal type, end suction, canned rotor design.
- Standard Control Processor—The standard control system is microprocessor-based with an external LCD numerical display to allow observation of specified adjustable functions. Normal operating conditions are indicated on the LCD panel, which is mounted either on the unit or on the wall, depending on application details (see user manual, SL-16671). The control system also monitors unit operation and activates an alarm when any of the specified factory preset conditions are exceeded.
- Cabinet and Frame—Custom powder painted steel panels. A hinged control access panel opens to a second front panel, which is a protected enclosure for all high voltage components. Frame is constructed of 14 gauge heliarc welded tubular steel and painted using an auto-deposition coating system.

### 4.11.1 Liebert XDC Optional Features

- Water / Glycol Condensers—A water/glycol floor stand condenser option is available for heat rejection requirements. The water/glycol floor stand can be located beneath the XDC unit or installed nearby.

**Figure 58 Liebert XDC dimensional data**

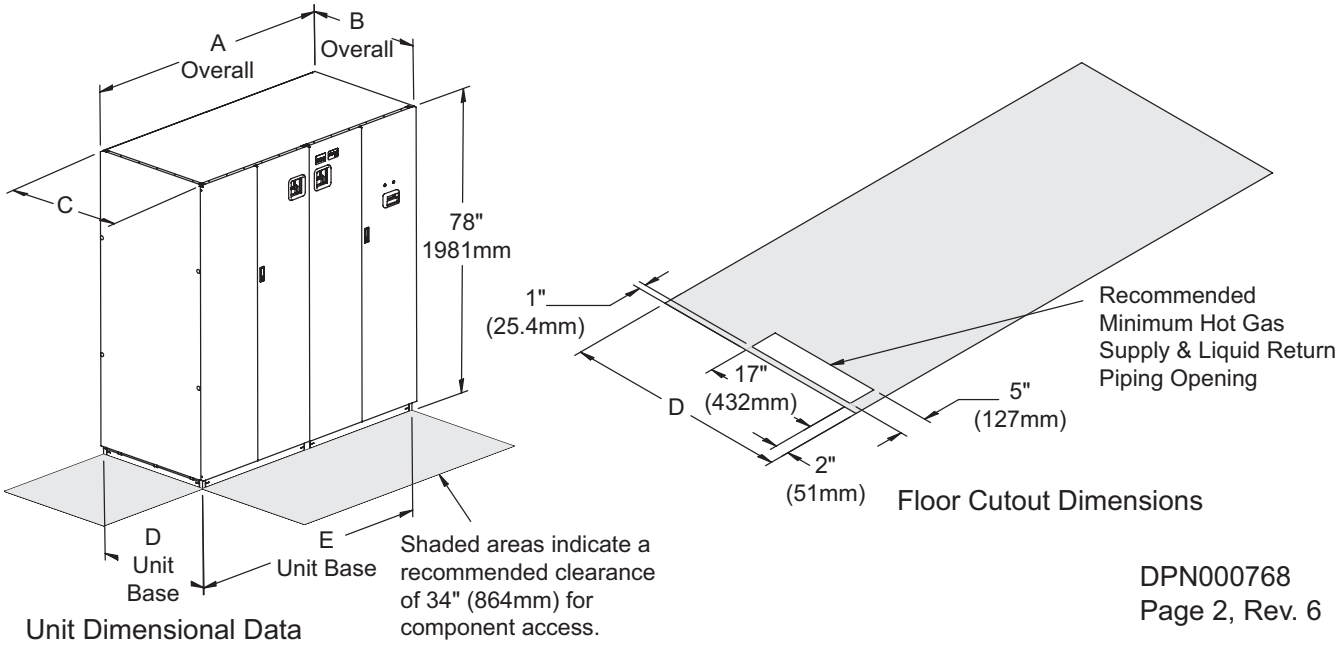
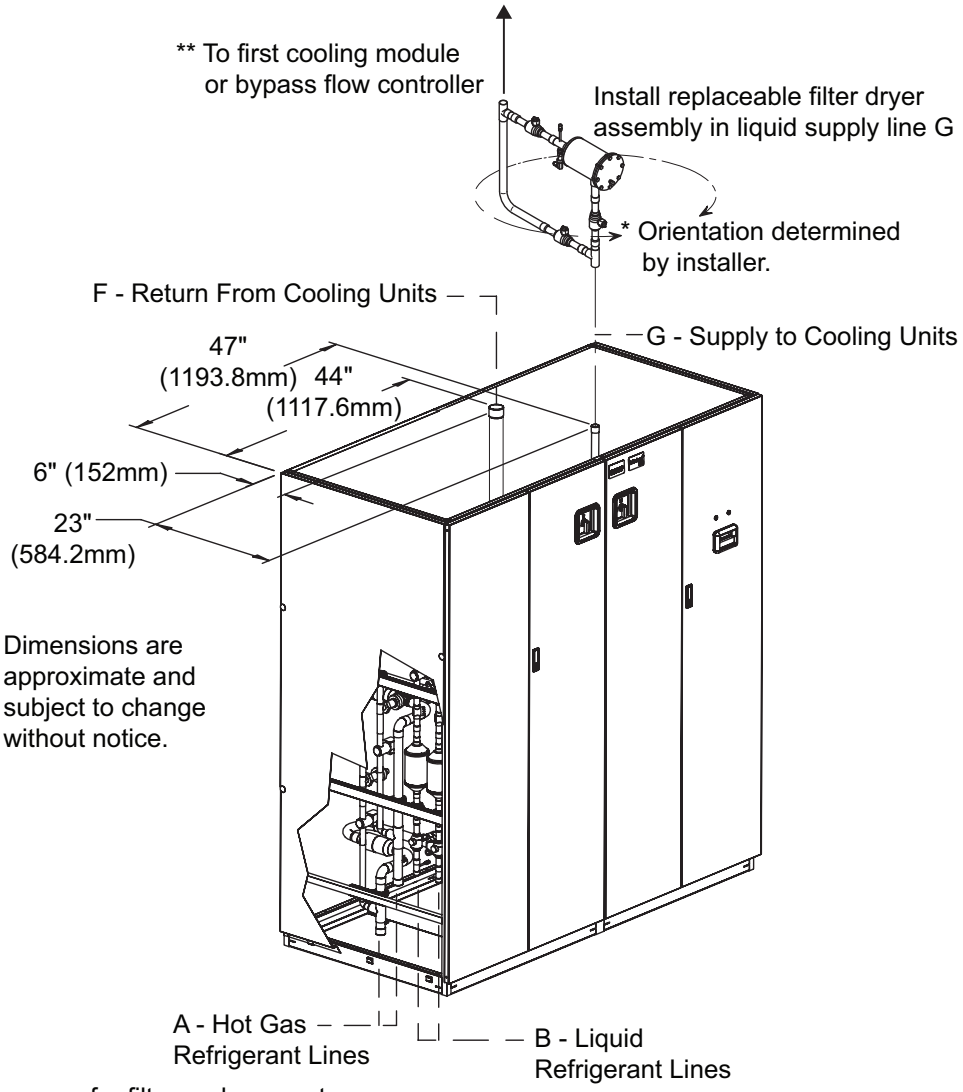



**Table 24 Liebert XD Chiller dimensions, weight**

| Air Cooled Model | Dimensional Data, inches (mm) | | | | | Shipping Weight, lb (kg) | |
|---|---|---|---|---|---|---|---|
| 50/60Hz | A | B | C | D | E | Domestic | Export |
| Liebert XDC160 | 74 (1880) | 34 (864) | 33-1/8 (841) | 33 (838) | 72 (1829) | 1945 (882) | 2093 (949) |

* Dimension does not include the bezel of the disconnect switch.

**Figure 59 Liebert XDC piping locations**




* Allow 8" (204mm) of clearance for filter replacement

** To ensure all refrigerant flow is filtered, install the filter dryer assembly between the discharge line of the XDC and the first bypass flow controller or the first cooling module.

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**Table 25 Liebert XD Chiller piping connection sizes**

| Air Cooled Models | Piping Outlet Connection Sizes, OD Cu, inches | | | | | | |
|---|---|---|---|---|---|---|---|
| **50/60Hz** | **A** | **B** | **C** | **D** | **E** | **F** | **G** |
| Liebert XDC160 | 1-3/8 | 7/8 | - | - | - | 2-1/8 | 1-1/8 |

**Figure 60 Positioning a water/glycolLiebert XDC for placement on a floor stand**

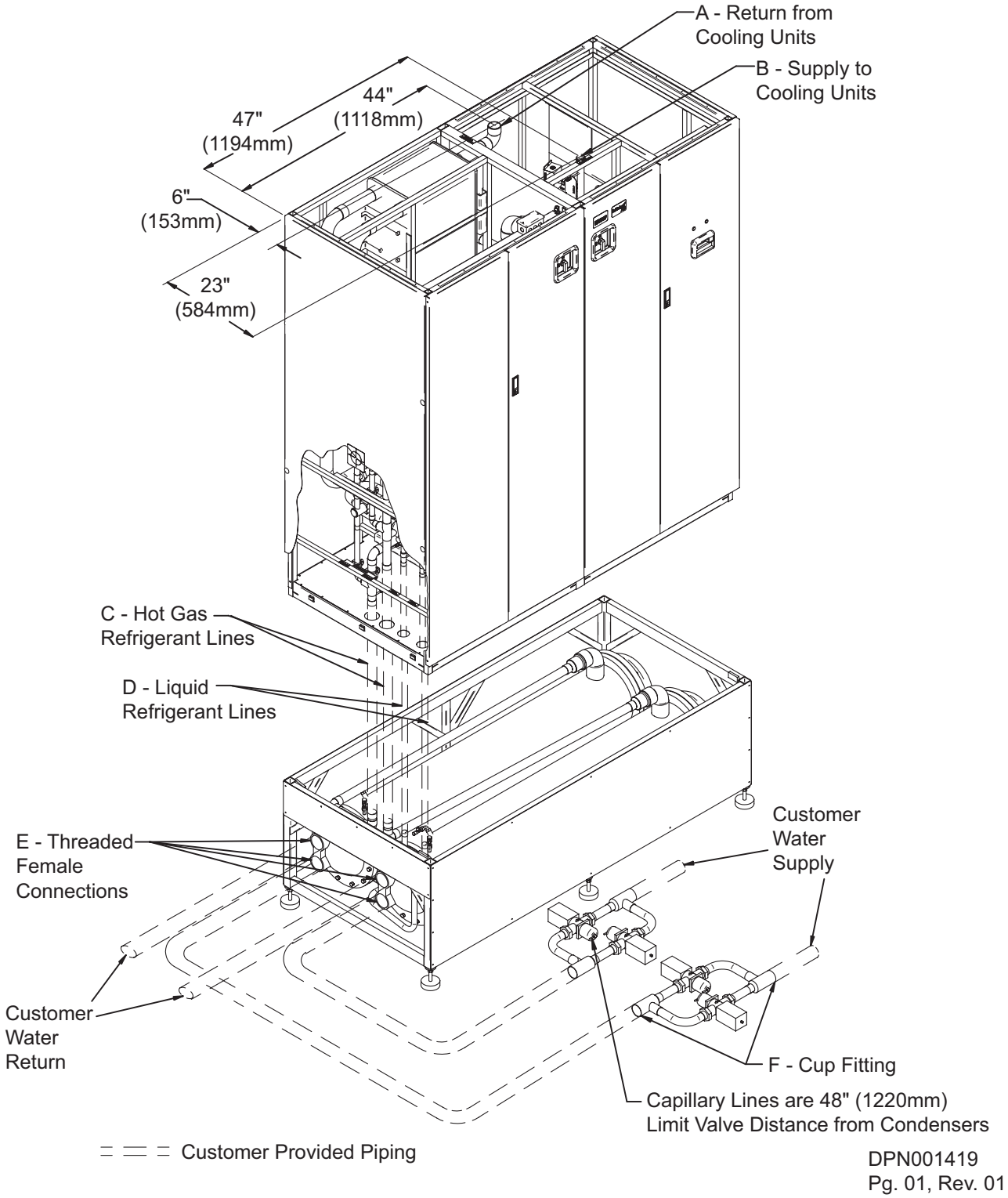
A - Return from Cooling Units
B - Supply to Cooling Units
47" (1194mm)
44" (1118mm)
6" (153mm)
23" (584mm)
C - Hot Gas Refrigerant Lines
D - Liquid Refrigerant Lines
E - Threaded Female Connections
Customer Water Supply
Customer Water Return
F - Cup Fitting
Capillary Lines are 48" (1220mm) Limit Valve Distance from Condensers
Customer Provided Piping
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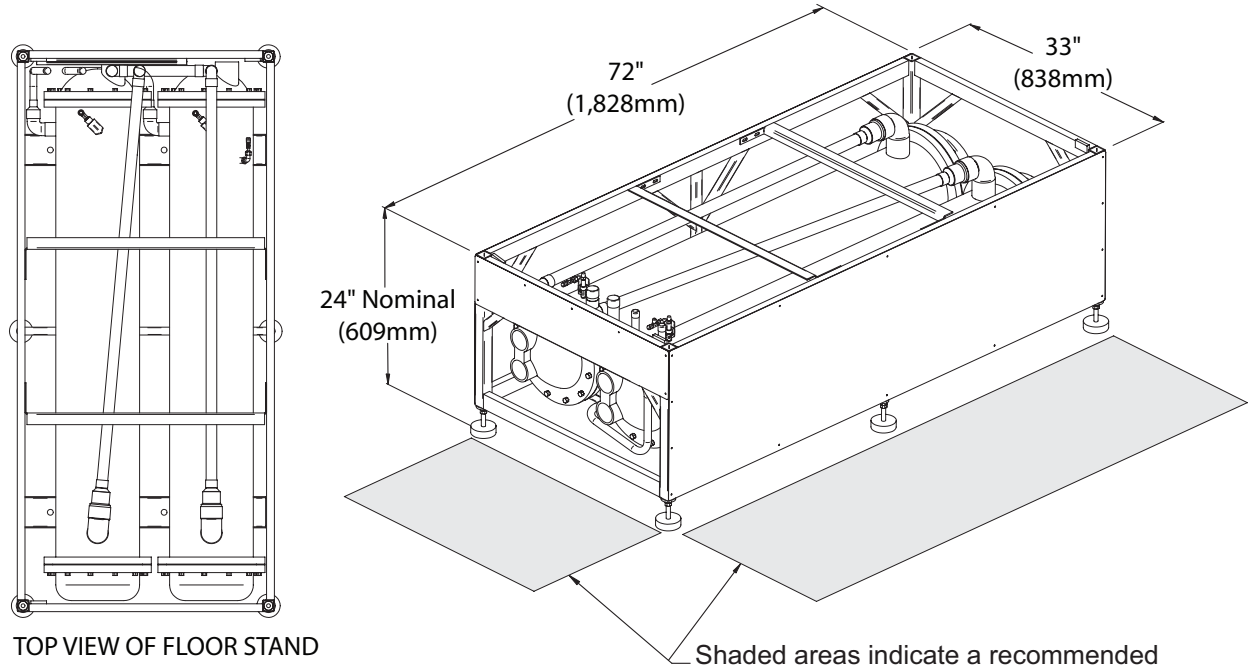
**Table 26 Liebert XDC Water/Glycol Piping Connection Sizes**

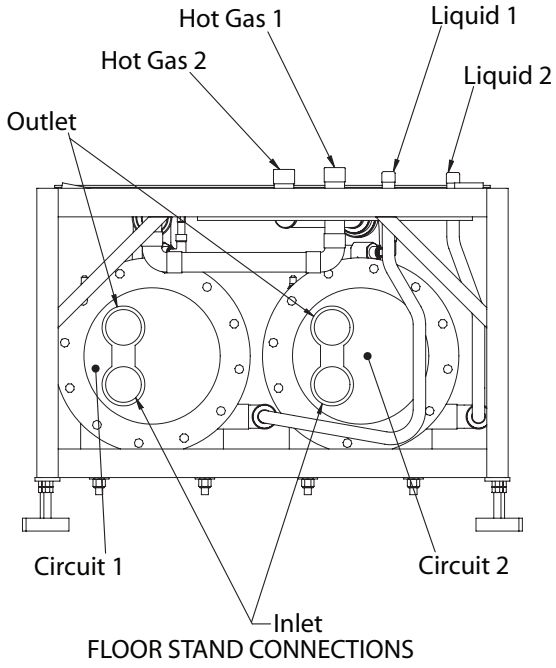
| Model | Piping Outlet Connection Sizes, OD Cu, inches | | | | | |
|---|---|---|---|---|---|---|
| 50/60Hz | A | B | C | D | E* | F** |
| XDC160 | 2-1/8 | 1-1/8 | 1-3/8 | 7/8 | 2-1/2 | 2-1/8 or 2-5/8 |

* Threaded Female Conection

** 2-1/8" for 1" WRV, 2-5/8" for 1-1/4" WRV

**Figure 61 Piping locations—floor stand and valve assembly**



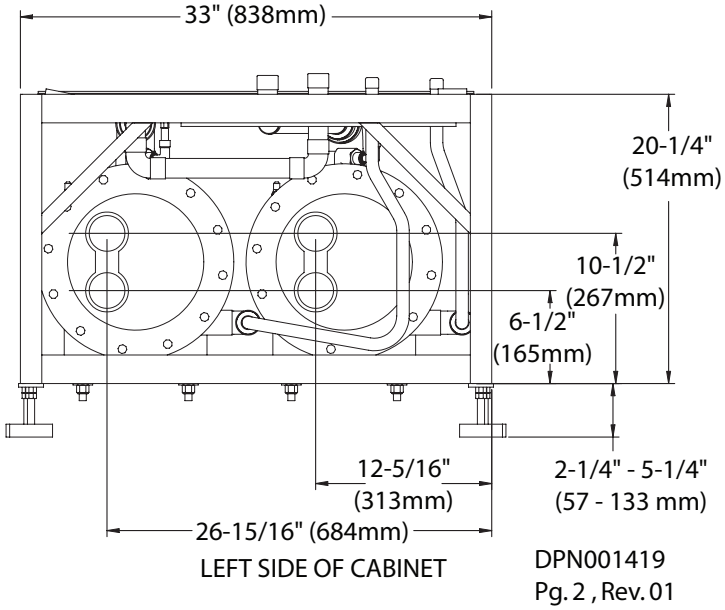



**Figure 62 Front view of Liebert XDC and electrical enclosures**

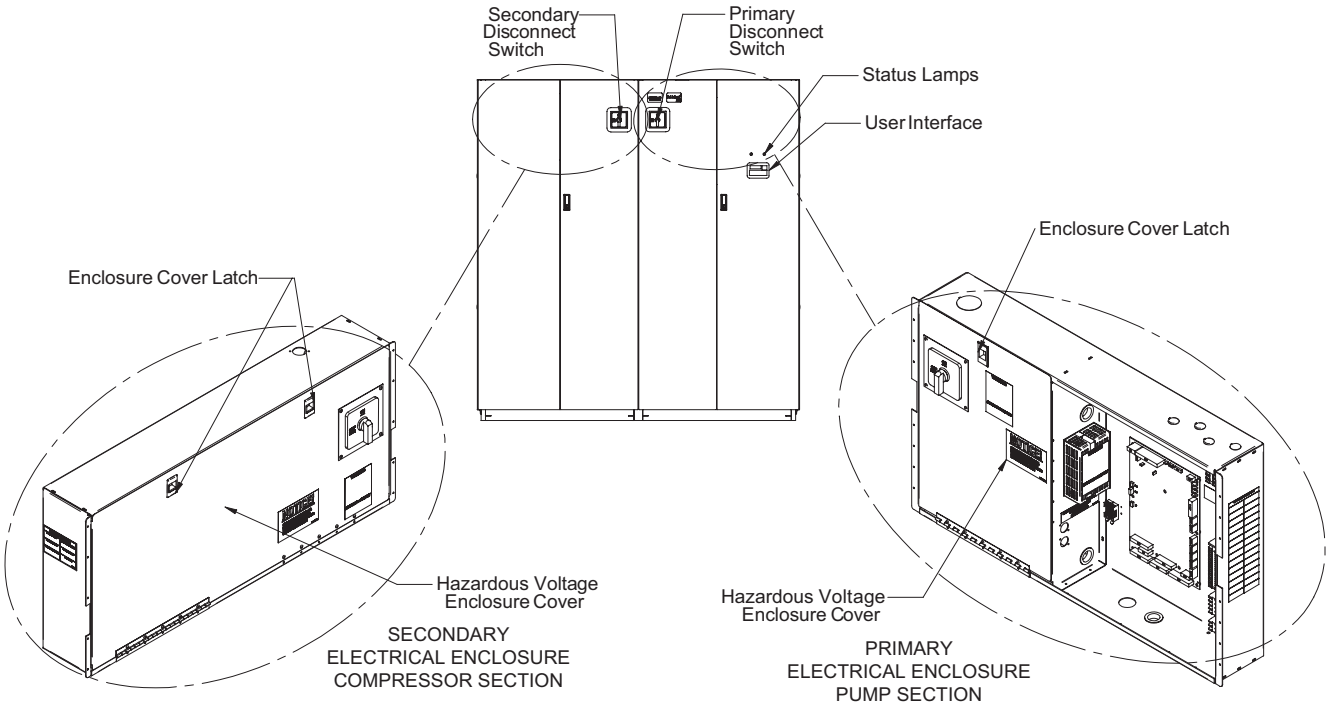



**Figure 63 Liebert XDC electrical enclosure knockout locations for field wiring**

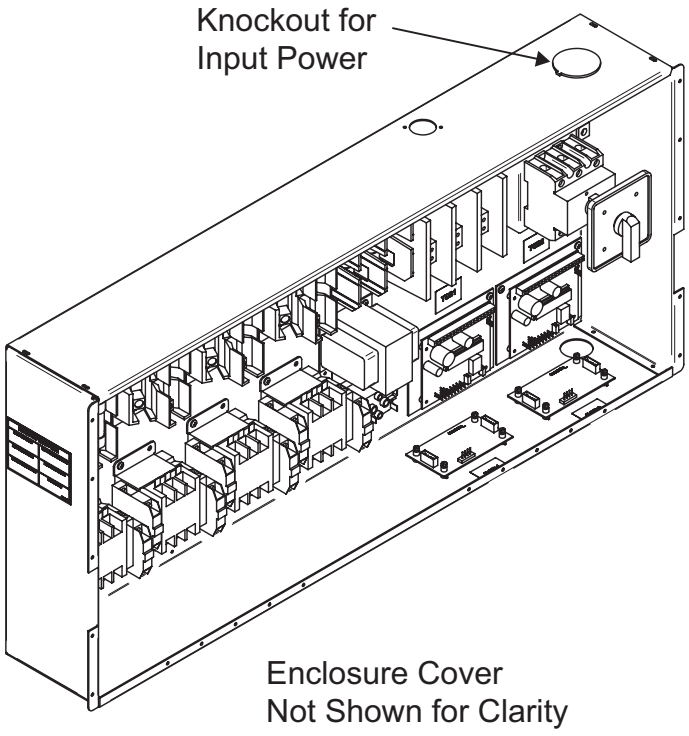


**Figure 64 Liebert XDC high voltage connections—primary disconnect switch, 60Hz models**

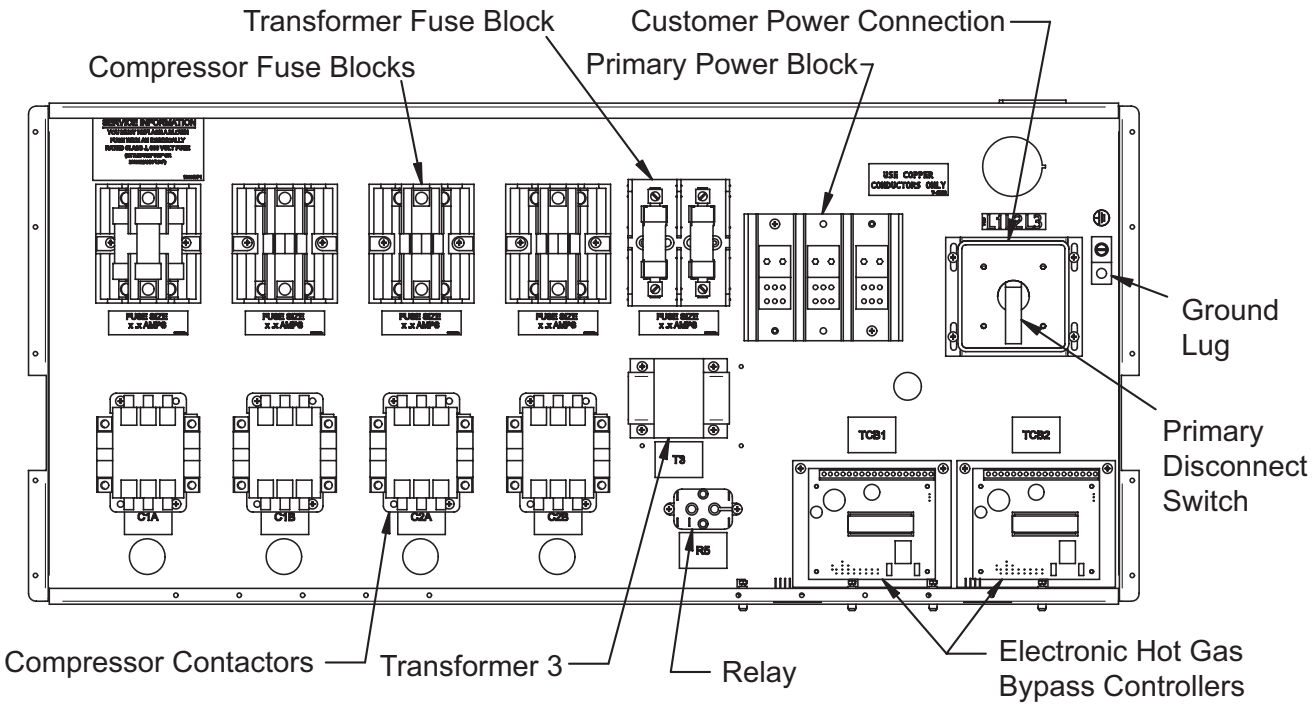



**Figure 65 Liebert XDC high voltage connections—primary disconnect switch, 50Hz models**

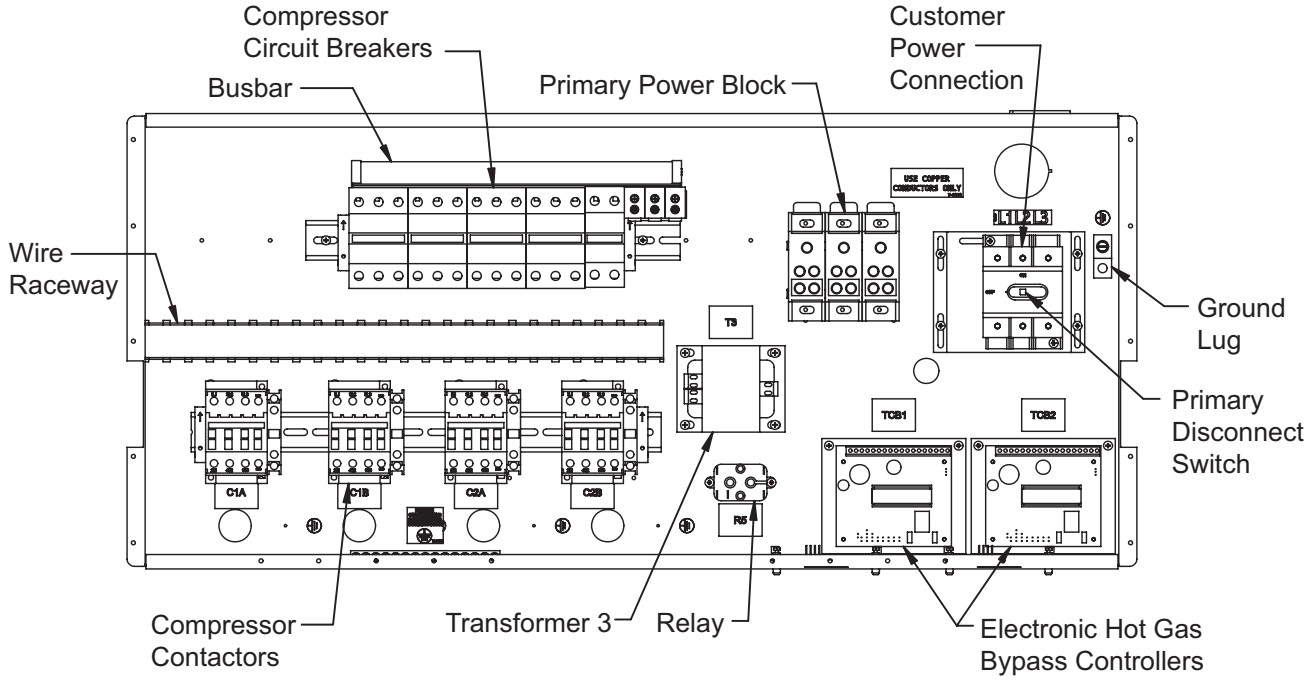


**Figure 66 Liebert XDC high voltage connections—secondary disconnect switch, 60Hz models**

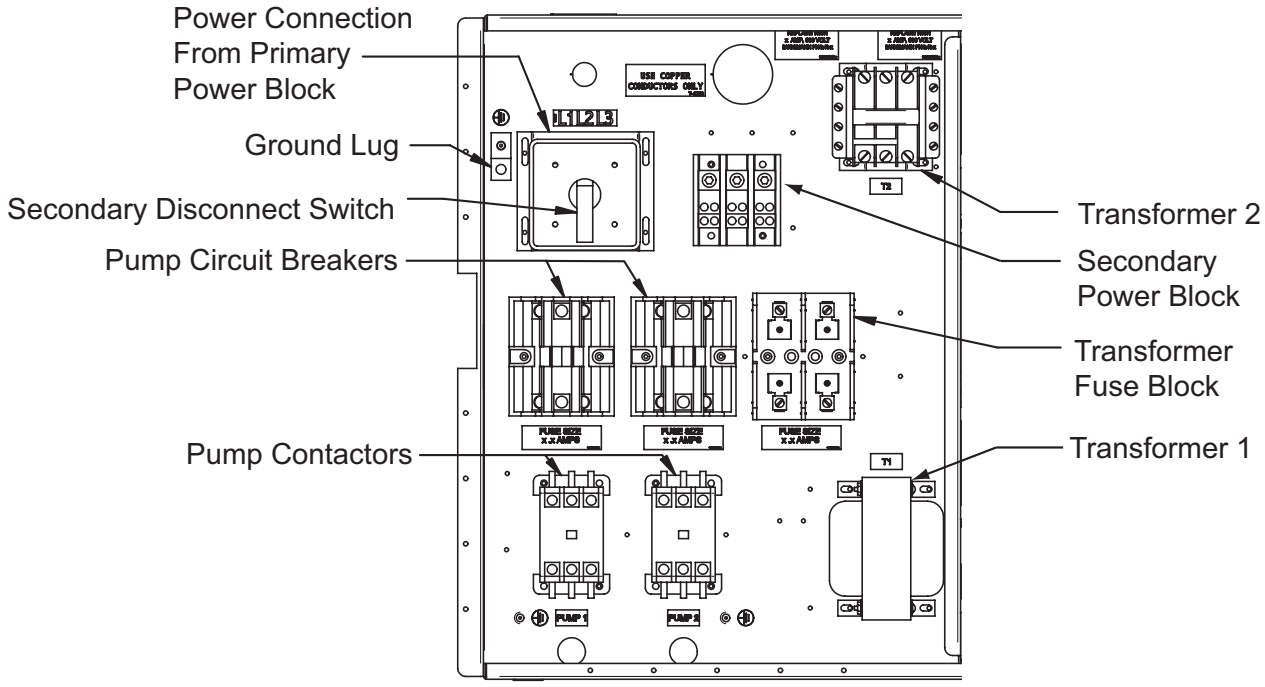



**Figure 67 Liebert XDC high voltage connections—secondary disconnect switch, 50Hz models**

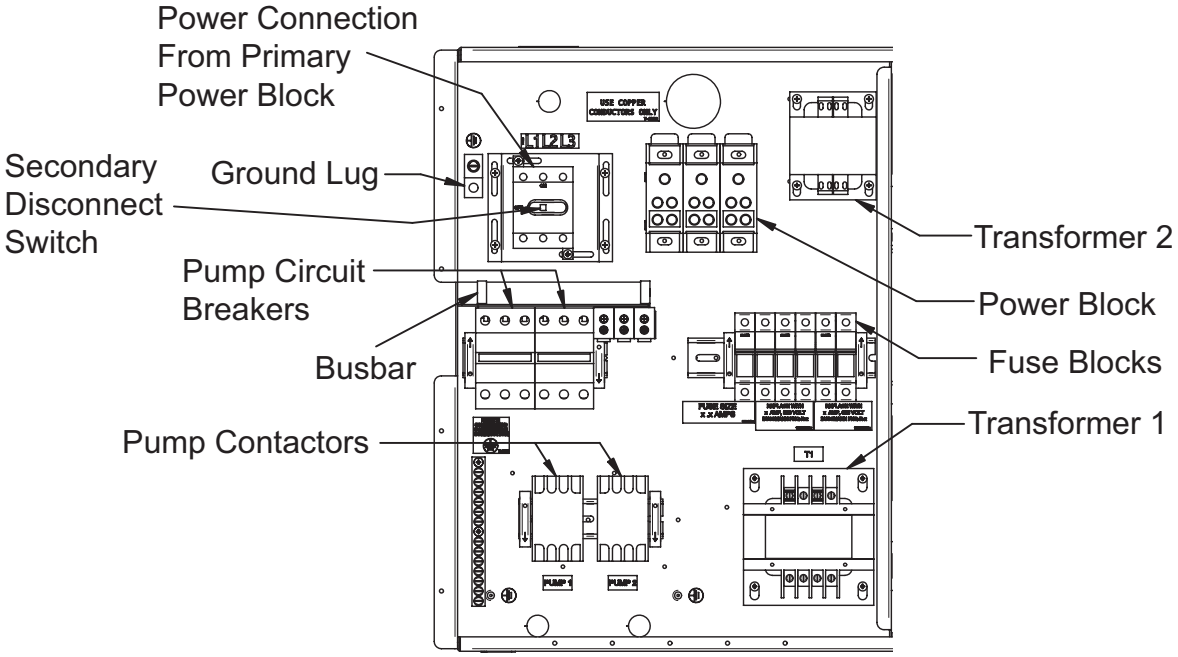


**Figure 68 Liebert XDC heat rejection electrical connection points**

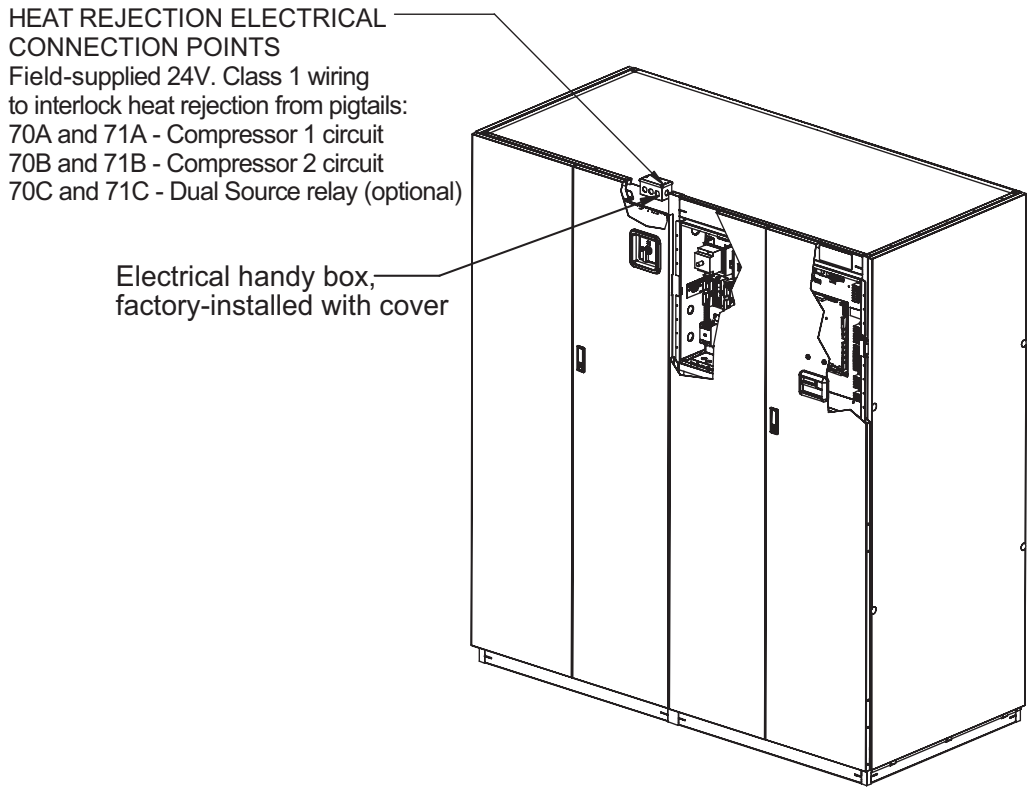

HEAT REJECTION ELECTRICAL
CONNECTION POINTS
Field-supplied 24V. Class 1 wiring
to interlock heat rejection from pigtails:
70A and 71A - Compressor 1 circuit
70B and 71B - Compressor 2 circuit
70C and 71C - Dual Source relay (optional)
Electrical handy box,
factory-installed with cover

**Figure 69 Liebert XDC electrical enclosure knockout locations for Extra Low Voltage connections**

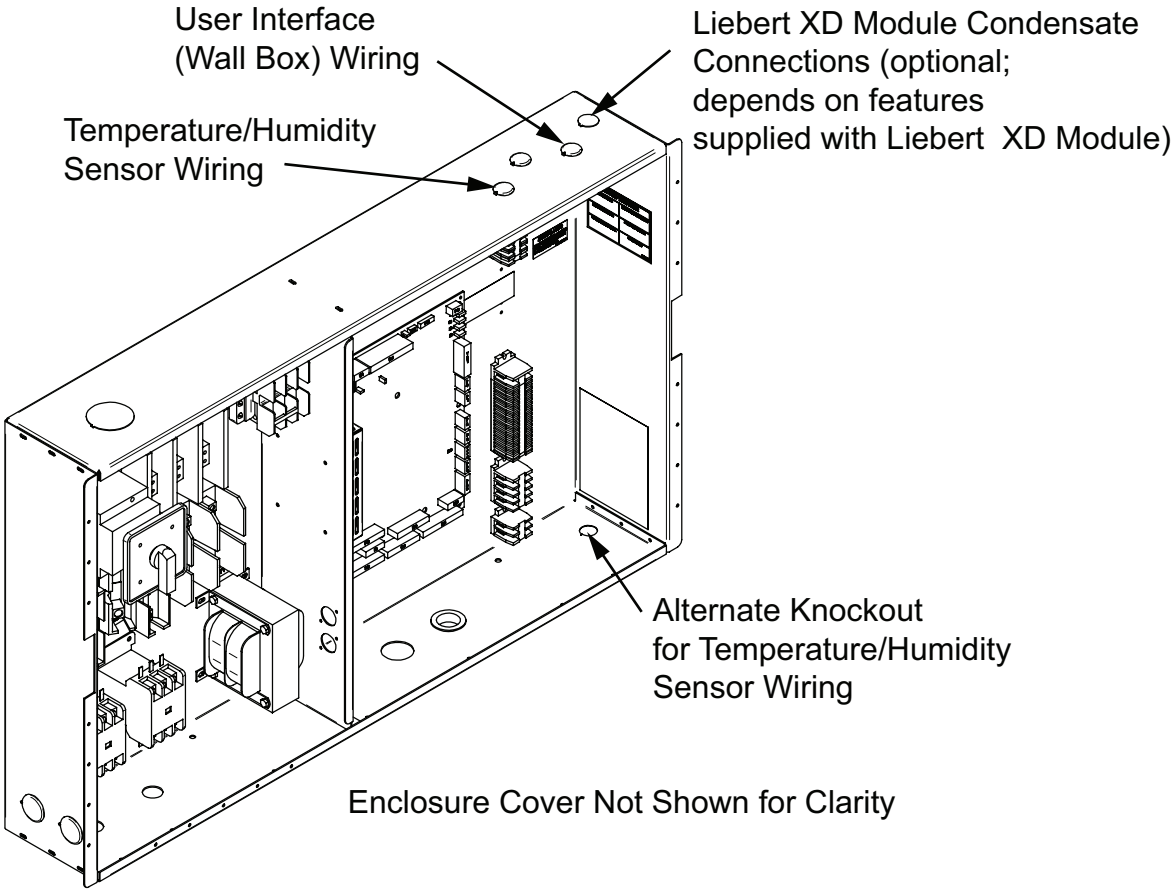
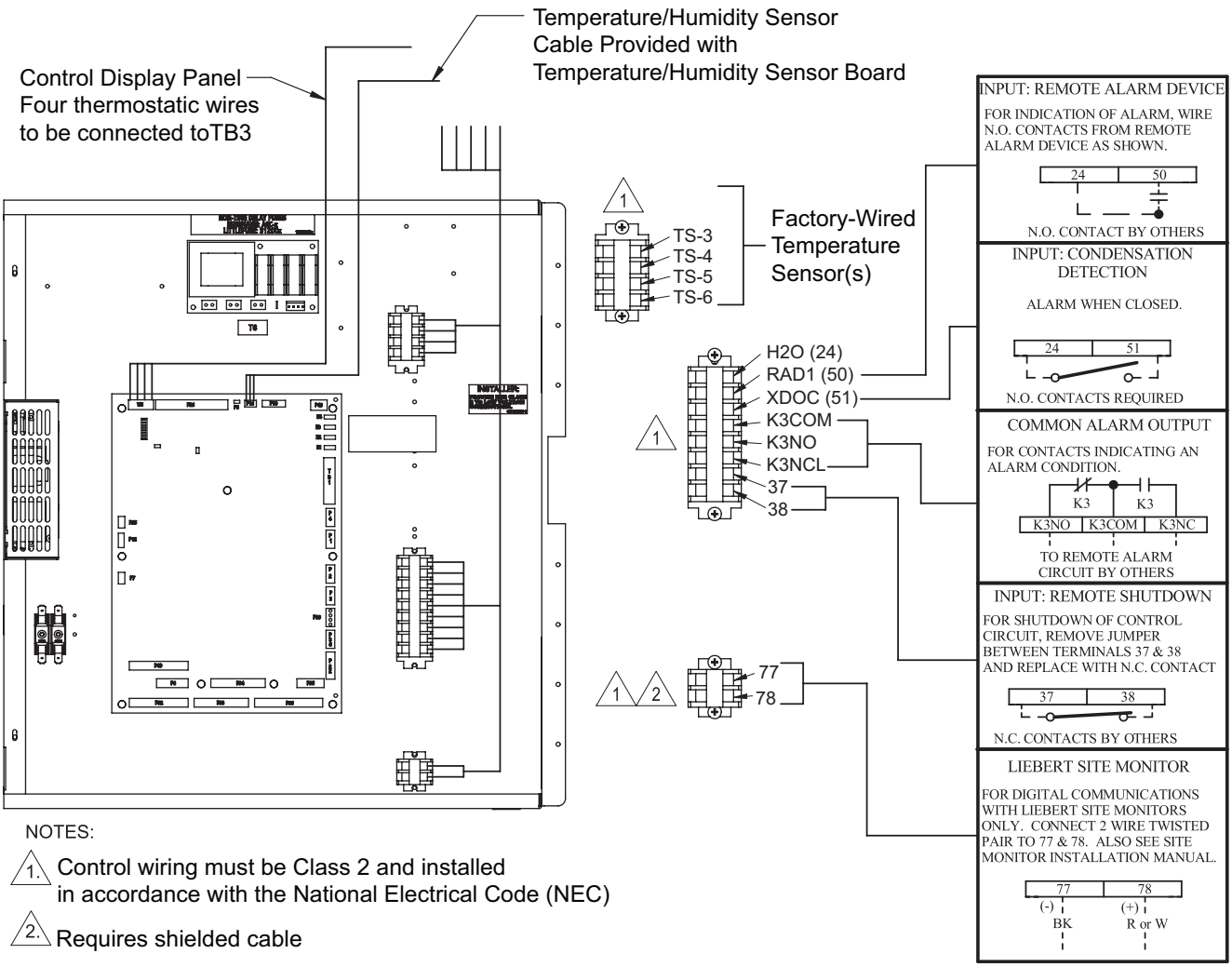


**Figure 70 Liebert XDC Extra Low Voltage field connections points**




NOTES:

1. Control wiring must be Class 2 and installed in accordance with the National Electrical Code (NEC)
2. Requires shielded cable

# 5.0 SPECIFICATIONS

**Table 27 Liebert XDC160 specifications**

| Models | XDC160 Air | | XDC160 Water / Glycol |
|---|---|---|---|
| | **XDC160AA** | **XDC160AM** | **189192G3 189192G5** |
| **Cooling Capacity, tons (kW)** | 46 (160) | 37 (130) | See **Tables 28**, **29** and **30** for Water/Glycol performance data |
| **Minimum Load** | The Liebert XDC's minimum recommended operating load is 40% of system nominal capacity. For example, a Liebert XDC160 60Hz system's minimum load would be 64 kW. Loading below this value can unfavorably affect system operation. Consult factory for any loading below this recommendation. | | |
| **Electrical Requirements** | | | |
| Input | 460V-3ph-60Hz | 380/415V-3ph-50Hz | 460V-3ph-60Hz |
| Full Load Amps | 79A | | |
| Minimum supply wire sizing ampacity | 84A | | |
| Maximum fuse or circuit breaker size | 100A | | |
| **Dimensions, inches (mm)** | | | |
| Height - Main unit only | 78 (1981) | | |
| Height - Main unit only, as shipped | 83 (2108) | | |
| Width - Main unit | 74 (1879) | | |
| Depth - Main unit | 34-5/8 (879) | | |
| Height - Water / Glycol cooled condenser stand | N/A | | 24 (607) |
| Width - Water / Glycol cooled condenser stand | N/A | | 72 (1829) |
| Depth - Water / Glycol cooled condenser stand | N/A | | 33 (839) |
| **Weight, lb (kg)** | | | |
| Main unit only | 1800 (817) | | |
| Main unit only, as shipped | Domestic: 1945 (882); Export: 2093 (949) | | |
| Water / Glycol cooled condenser stand | N/A | | 1075 (488) |
| Water / Glycol cooled condenser stand, as shipped | N/A | | 1150 (521) |
| **Pipe Connections, inches, O.D., Cu** | | | |
| Liebert XD Coolant supply to XD cooling modules | 1-1/8 | | |
| Liebert XD Coolant return from XD cooling modules | 2-1/8 | | |
| Liquid line, DX circuit | 7/8 | | |
| Hot gas line, DX circuit | 1-3/8 | | |
| **Heat Rejection Equipment** | | | |
| 95°F ambient air cooled condenser | 1-CDL830 or 2-CSL415 | | N/A |
| **Number of XD Cooling Units Connected, Maximum (Minimum)** | | | |
| Liebert XDCF10 | 16 (6) | | |
| Liebert XDH20 | 8 (4) | | |
| Liebert XDH32 | 5 (2) | | |
| Liebert XDO16 | 10 (4) | | |
| Liebert XDO20 | 8 (4) | | |
| Liebert XDV8 | 20 (8) | | |
| Liebert XDV10 | 16 (7) | | |
| **Cabinet Exterior Finish** | Black, matte finish, heat-fused powder coat | | |
| **Maximum Ambient Operating Temperature °F(°C)** | 86 (30) | | |
| **Agency** | | | |
| Approvals | CSA | CE | CSA |

**Table 28 Floor stand specifications—water-cooled Liebert XDC**

| Models - 60 Hz | XDC160 Water Floor Stand - 60Hz | | | | |
|---|---|---|---|---|---|
| Entering Fluid Temp °F (C) | 65 (18) | 70 (21) | 75 (24) | 85 (29) | 95 (35) |
| **Performance Data** | | | | | |
| Cooling capacity, tons (kW) | 46.1(162.3) | 46.1(162.3) | 46.1(162.3) | 46.1(162.3) | 44.5(156.5) |
| Flow, GPM | 50 | 58 | 70 | 110 | 142 |
| Pressure Drop, psi (Ft Water) | 2.7 (6.2) | 4.9 (11.3) | 5.4 (12.5) | 20.7 (47.8) | 27.3 (63.1) |
| **Heat Rejection Equipment** | | | | | |
| Water regulating valve size | 1" | 1" | 1" | 1" | 1" |
| **Piping Connections** | | | | | |
| Water / glycol supply and return lines | 2-1/8" | 2-1/8" | 2-1/8" | 2-1/8" | 2-1/8" |

**Table 29 Floor stand specifications—Liebert XDC with 40% propylene glycol**

| Models - 60 Hz | XDC160 Glycol Floor Stand - 60Hz - 40% PG | | |
|---|---|---|---|
| Outside Ambient °F (°C) | 95 (35) | 100 (38) | 105 (41) |
| Entering Fluid Temp °F (°C) | 110 (43) | 110 (43) | 110 (43) |
| **Performance Data** | | | |
| Cooling capacity, tons (kW) | 42.5 (149.4) | | |
| Total Heat Rejection, (kW) | 192.6 | | |
| Flow, GPM | 206 | | |
| Pressure Drop, psi (ft water) | 37.2 (85.9) | | |
| **Heat Rejection Equipment** | | | |
| Drycooler | DNT 940A | | 2 x DNT 880A* |
| Drycooler Pressure Drop, psi (ft water) | 6.7 (15.5) | | 2.9 (6.6) |
| Glycol pump package - 10hp | 9A31258G3 | | |
| Pump Control Package - 208V | 9A34606G47 | | |
| Pump Control Package - 460V | 9A32114G4 | | |
| Pump Total Head @ 204 GPM, ft water | 145 | | |
| Water regulating valve size | 1-1/4" | | |
| **Piping Connections** | | | |
| Water / glycol supply and return lines | 2-5/8" | | |

* When multiple drycoolers are used ensure flow is balanced.

**Table 30 Floor stand specifications—Liebert XDC with 40% ethylene glycol**

| Models - 60 Hz | XDC160 Glycol Floor Stand - 60Hz - 40% EG | | |
|---|---|---|---|
| Outside Ambient °F (°C) | 95 (35) | 100 (38) | 105 (41) |
| Entering Fluid Temp °F (°C) | 110 (43) | 110 (43) | 110 (43) |
| **Performance Data** | | | |
| Cooling capacity, tons (kW) | 42.5 (149.4) | | |
| Total Heat Rejection, (kW) | 192.6 | | |
| Flow, GPM | 204 | | |
| Pressure Drop, psi (ft water) | 35.9 (82.9) | | |
| **Heat Rejection Equipment** | | | |
| Drycooler | DNT 940A | | 2 x DNT 880A* |
| Drycooler Pressure Drop, psi (ft water) | 6.5 (15.1) | | 2.7 (6.3) |
| Glycol pump package - 10HP | 9A31258G3 | | |
| Pump Control Package - 208V | 9A34606G47 | | |
| Pump Control Package - 460V | 9A32114G4 | | |
| Pump Total Head @ 204 GPM, ft water | 145 | | |
| Water regulating valve size | 1-1/4" | | |
| **Piping Connections** | | | |
| Water / glycol supply and return lines | 2-5/8" | | |

* When multiple drycoolers are used ensure flow is balanced.

**Table 31 Liebert XDP160 specifications**

| Models | XDP160RC | XDP160RA | XDP160RM |
|---|---|---|---|
| **Cooling Capacity, Nominal** | 160 kW / 46 Tons, 60Hz | | 140 kW / 40 Tons, 50Hz |
| | Each capacity is based on 45ºF (7ºC) entering water temperature and 140gpm (530lpm) water flow rate. Capacity is reduced when glycol mixtures are used in place of 100% water. | | |
| **Minimum Load** | The Liebert XDP's minimum recommended operating load is 20% of system nominal capacity. For example, a Liebert XDP160 60Hz system's minimum load would be 32 kW. Loading below this value can unfavorably affect system operation. Consult factory for any loading below this recommendation. | | |
| **Electrical Requirements** | | | |
| Input | 208V/3ph/60Hz | 460V/3/ph60Hz | 380/415V/3ph/50Hz |
| Full Load Amps | 4A | 2.1A | 2.3A |
| **Dimensions, inches (mm)** | | | |
| Height – Unit only | 78 (1981) | | |
| Height – As shipped | 83 (2108) | | |
| Width | 38 (965) | | |
| Depth | 34 (864) | | |
| **Weight, lb (kg)** | | | |
| Unit only | 821 (372) | | |
| Shipping weight | Domestic: 990 (449); Export: 1067 (484) | | |
| Installed, with refrigerant and chilled water | 1038 (471) | | |
| **Pipe Connections** | | | |
| Refrigerant supply to Liebert XD cooling module | 1-1/8" OD, Cu | | |
| Refrigerant return from Liebert XD cooling module | 2-1/8" OD, Cu | | |
| Chilled water supply and return | 2-5/8" OD, Cu | | |
| **Control valve** | 2-way, 2" nominal | | |
| **Pressure Drop – Chilled Water Side** | 20 psig (137kPa, 1.38bar), with 140 gpm (530lpm) water flow rate, control valve fully open | | |
| **Temperature Rise – Chilled Water Side at rated flow, °F (°C)** | 8.0 (4.4) | | 6.9 (3.8) |
| **Number of Liebert XD cooling units connected, maximum (minimum** | | | |
| Liebert XDCF10 | 16 (4) | | |
| Liebert XDH20 | 8 (2) | | |
| Liebert XDH32 | 5 (1) | | |
| Liebert XDV8 | 20 (4) | | |
| Liebert XDV10 | 16 (4) | | |
| Liebert XDO16 | 10 (2) | | |
| Liebert XDO20 | 8 (2) | | |
| **Cabinet Exterior Finish** | Black, matte finish, heat-fused powder coat | | |
| **Operating Ambient Temperature, Maximum, °F (°C)** | 86 (30) | | |
| **Agency** | | | |
| Approvals | CSA 60Hz | | CE 50Hz |

**Table 32 Liebert XDO16 specifications**

| | | | |
|---|---|---|---|
| **Models** | XDO16BK--0<br>XDO16DK--0<br>XDO16BK-E0<br>XDO16DK-E0<br>XDO16BKP-0<br>XDO16BKPE0<br>XDO16DKP-0<br>XDO16DKPE0<br>(60Hz) | XDO16BSP-0<br>XDO16BSPE0<br>XDO16DSP-0<br>XDO16DSPE0<br>XDO16BS--0<br>XDO16DS--0<br>XDO16BS-E0<br>XDO16DS-E0<br>(60Hz) | XDO16BSP-0<br>XDO16BSPE0<br>XDO16DSP-0<br>XDO16DSPE0<br>XDO16BS--0<br>XDO16DS--0<br>XDO16BS-E0<br>XDO16DS-E0<br>(50Hz) |
| **Cooling Capacity** | Nominal (92°F [33°C] EAT): 17.2kW / 5 Tons<br>Maximum (90°F [32°C] EAT): 17.2 kW / 5 Tons | | Nominal (92°F [33°C] EAT): 17.1kW/4.9Tons<br>Maximum (93°F [34°C] EAT): 17.2 kW / 5 Tons |
| **Conditions** | Capacity rating is @ 55°F (13°C) Entering Fluid Temperature and 50ºF or lower dew point | | |
| **Electrical Requirements** | | | |
| Input Voltage | 1ph-60Hz-120V | 1ph-50 Hz-220-240V | 1ph-50 Hz-230V |
| Input Power Connections | Terminal blocks provided internal to unit | | |
| Full Load Amps | 2.7A @ 120V | 1.50 @ 230V | 1.19 @ 230V |
| Wire Size Amps | 3.4 | 2.0 | 1.28 |
| Overcurrent Protection Device | 15 | 15 | 15 |
| Power consumption, nominal, watts | 335 | 250 | 250 |
| **Dimensions, inches (mm)** | | | |
| Length | 72-1/4 (1835) | | |
| Width | 24-1/8 (613) | | |
| Height | 22-1/2 (572) not including electrical and piping access | | |
| **Weight, lb (kg)** | | | |
| Unit only | 150 (68) | | |
| Shipping weight | 238 (108) | 296 (134) | |
| Installed, with refrigerant, without options | 155 (70) | | |
| **Number of Fans** | 1 | 1 | |
| **Airflow, Nominal, $ft^3$/ min ($m^3$/ hr)** | 2700 (4587) | 2250 (3822) | |
| **Audible Noise** | 85 dBa sound power | 83 dBa sound power | |
| **Pipe Connections** | | | |
| Refrigerant Supply from Liebert XDP/Liebert XDC | 1/2" OD, Copper | | |
| Refrigerant Return to Liebert XDP/Liebert XDC | 7/8" OD, Copper | | |
| **Serviceable Parts** | Fan and electrical components | | |
| **Exterior Finish – Bottom, Sides, Front and Rear** | Black, matte finish, heat-fused powder coat | | |
| **Exterior Finish - Top** | Hot-dipped galvanized steel | | |
| **Agency** | | | |
| Approvals | CSA 60 Hz | CSA 60Hz | CE 50Hz |

| **Options** | | |
|---|---|---|
| Lighting Fixtures (ship loose) | 2 Liebert XDOs per lighting unit; 120V or 277V; 4’ standard fluorescent tubes (not included) | |
| Power, optional lighting fixture | 0.9A per 120V light fixture; 0.4A per 277V light fixture | None |
| Condensate sensing (factory-installed) | Dry contact 24VAC - 1A maximum | |

**Table 33 Liebert XDO20 specifications**

| **Models** | XDO20DK--*; XDO20BKP-* XDO20DKP-*; XDO20BK-E* XDO20DK-E*; XDO20BKPE* XDO20DKPE* | XDO20BS--*; XDO20DS--* XDO20BSP-*; XDO20DSP-v XDO20BS-E*; XDO20DS-E* XDO20BSPE*; XDO20DSPE* | |
|---|---|---|---|
| | 60Hz | 60Hz | 50Hz |
| **Cooling Capacity** | Nominal (92°F [33°C] EAT): 20kW / 5.7 Tons Maximum (100°F [38°C] EAT): 23kW / 6.5 Tons | | Nominal (92°F [33°C] EAT): 17.7kW / 5 Tons Maximum (103°F [39°C] EAT): 23kW / 6.5 Tons |
| **Conditions** | Capacity rating is @ 55ºF (13°C) Entering Fluid Temperature and 50ºF (10°C) or lower dew point | | |
| **Electrical Requirements** | | | |
| Input Voltage | 1ph-60Hz-120V | 1ph-60Hz-220-240V | 1ph-50 Hz-220-240V |
| Input Power Connections | Terminal blocks provided internal to unit | | |
| Full Load Amps | 2.7A @ 120V | 1.64A @ 230V | 1.47 @ 230V |
| Wire Size Amps | 3.4 | 2.0 | 1.84 |
| Overcurrent Protection Device | 15 | 15 | 15 |
| Power consumption, nominal, watts | 335 | 350 | 250 |
| **Dimensions, inches (mm)** | | | |
| Length | 72-1/4 (1835) | | |
| Width | 24-1/8 (613) | | |
| Height | 22-1/2 (572) not including electrical and piping access | | |
| **Weight, lb (kg)** | | | |
| Unit only | 150 (68) | | |
| Shipping weight | 238 (108) | 296 (134) | |
| Installed, with refrigerant, without options | 155 (70) | | |
| **Number of Fans** | 1 | | 1 |
| **Airflow, Nominal, $ft^3$/ min ($m^3$/ hr)** | 2700 (4587) | | 2250 (3822) |
| **Audible Noise** | 85 dBa sound power | | 83 dBa sound power |
| **Pipe Connections (without flex pipe)** | | | |
| Refrigerant Supply from Liebert XDP/Liebert XDC | 1/2" OD, Copper | | |
| Refrigerant Return to Liebert XDP/Liebert XDC | 7/8" OD, Copper | | |
| **Serviceable Parts** | Fan and electrical components | | |
| **Exterior Finish – Bottom, Sides, Front and Rear** | Black matte finish, heat-fused powder coat | | |
| **Exterior Finish - Top** | Hot-dipped galvanized steel | | |
| **Agency** | | | |
| Approvals | CSA 60 Hz | | CE 50Hz |
| **Options** | | | |
| Lighting Fixtures (ship loose) | 2 Liebert XDOs per lighting unit; 120V or 277V; 4’ standard fluorescent tubes (not included) | | |
| Power, optional lighting fixture | 0.9A per 120V light fixture; 0.4A per 277V light fixture | | None |
| Condensate sensing (factory-installed) | Dry contact 24VAC - 1A maximum | | |
| Pre-Charged Refrigerant | R-134a Refrigerant, one-shot connections | | |

* = Revision level

**Table 34 Liebert XDO20 dimensions—domestic and export**

| Model | Shipping Dimensions, inches (mm) | | | | | | Unit Dimension Unpacked, inches (mm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Domestic | | | Export | | | | | |
| | Length | Width | Height | Length | Width | Height | Length | Width | Height * |
| All Models | 84 (2134) | 30 (762) | 30 (762) | 83 (2108) | 30 (762) | 30 (762) | 72-1/4 (1835) | 24-1/8 (613) | 25-1/2 (648) |

* Includes piping connections

**Table 35 Liebert XDO16 dimensions—domestic and export**

| Model | Shipping Dimensions, inches (mm) | | | | | | Unit Dimension Unpacked, inches (mm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Domestic | | | Export | | | | | |
| | Length | Width | Height | Length | Width | Height | Length | Width | Height * |
| All Models | 84 (2134) | 30 (762) | 30 (762) | 83 (2108) | 30 (762) | 30 (762) | 72-1/4 (1835) | 24-1/8 (613) | 25-1/2 (648) |

* Includes piping connections

**Table 36 Liebert XDV8 specifications**

| Models | XDV8BK--*; XDV8DK--* XDV8BKP-*; XDV8DKP-* XDV8BK-E*; XDV8DK-E* XDV8BKPE*; XDV8DKPE* XDV8BKR-*; XDV8BKRE* XDV8DKR-*; XDV8DKRE* | XDV8BT--*; XDV8DT--* XDV8BTP-*; XDV8DTP-* XDV8BT-E*; XDV8DT-E* XDV8BTPE*; XDV8DTPE* XDV8BTR-*; XDV8BTRE* XDV8DTR-*; XDV8DTRE* | | XDV8BS--*; XDV8DS--* XDV8BSP-*; XDV8DSP-* XDV8BS-E*; XDV8DS-E* XDV8BSPE*; XDV8DSPE* XDV8BSR-*; XDV8BSRE* XDV8DSR-*; XDV8DSRE* |
|---|---|---|---|---|
| | 60 Hz | 60 Hz | 50 Hz | 50 Hz |
| **Cooling Capacity** | Nominal (98°F [37°C] EAT): 8.8kW / 2.5 Tons Maximum (95°F [35°C] EAT): 8.8kW / 2.5 Tons | | Nominal (98°F [37°C] EAT): 8kW / 2.3 Tons Maximum (103°F [39°C] EAT): 8.8kW/2.5Tons | |
| **Conditions** | Capacity rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point, rear air inlet. | | | |
| **Electrical Requirements** | | | | |
| Input | 120V model: 1ph-60 Hz | 230V model: 1ph-60 Hz | 230V model: 1ph-50 Hz | |
| Input power connections | 2 power connections, each model | | | |
| Full Load Amps | 120V model: 2.0A | 230V model: 1.0A | | |
| Power consumption, nominal, watts | 180 | 190 | 190 | 190 |
| **Dimensions, inches (mm)** | | | | |
| Height – unit only | 14 (355) not including pipe connections | | | |
| Height – including pipe connections | 18-5/8 (473) | | | |
| Width | 22-7/8 (581) | | | |
| Depth – Top | 39-1/2 (1003) | | | |
| Depth – Bottom | 29-5/8 (752) | | | |
| **Weight, lb (kg)** | | | | |
| Unit only | 77 (35) | | | |
| Shipping weight | 125 (57) | | | |
| Installed, with refrigerant | 79 (36) | | | |
| **Number of Fans** | 2 | 2 | 2 | 2 |
| **Airflow, Nominal, $ft^3$/ min ($m^3$/ hr)** | 1000 (1699) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet | | 833 (1415) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet | |
| **Audible noise** | 78 dBa sound power | | 73 dBa sound power | |
| **Pipe Connections (without Liebert Flex Pipe)** | | | | |
| Refrigerant Supply from Liebert XDP/ Liebert XDC | 1/2" OD Cu, (optional 1/2" threaded coupler flex piping) | | | |
| Refrigerant Return to Liebert XDP/Liebert XDC | 5/8" OD Cu, (optional 3/4" threaded coupler flex piping) | | | |
| **Serviceable Parts** | Fans and electrical components | | | |
| **Cabinet Exterior Finish** | Black, matte finish, heat-fused powder coat | | | |
| **Options** | | | | |
| Condensate sensing (factory-installed) | Dry contact outgoing signal | | | |
| Pre-Charged | R-134a Refrigerant, one-shot connections | | | |
| **Agency** | | | | |
| Approvals | CSA 60Hz | | CSA 50Hz | CE 50Hz |

* = Revision level of unit

**Table 37 Liebert XDV10 specifications**

| Models | XDV10BK--*; XDV10DK--* XDV10BKP-*; XDV10DKP-* XDV10BK-E*; XDV10DK-E* XDV10BKPE*; XDV10DKPE* XDV10BKR-*; XDV10BKRE* XDV10DKR-*; XDV10DKRE* | XDV10BT--*; XDV10DT--* XDV10BTP-*; XDV10DTP-* XDV10BT-E*; XDV10DT-E* XDV10BTPE*; XDV10DTPE* XDV10BTR-*; XDV10BTRE* XDV10DTR-*; XDV10DTRE* | | XDV10BS--*; XDV10DS--* XDV10BSP-*; XDV10DSP-* XDV10BS-E*; XDV10DS-E* XDV10BSPE*; XDV10DSPE* XDV10BSR-*; XDV10BSRE* XDV10DSR-*; XDV10DSRE* |
|---|---|---|---|---|
| | **60 Hz** | **60 Hz** | **50 Hz** | **50 Hz** |
| **Cooling Capacity** | Nominal (98ºF [37ºC] EAT): 10kW / 2.8 Tons Maximum (106ºF [41ºC] EAT): 11.8kW/3.4 Tons | | Nominal (98ºF [37ºC] EAT): 8kW / 2.3 Tons Maximum (116ºF [47ºC] EAT): 11.8kW/3.4 Tons | |
| **Conditions** | Capacity Rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point, rear air inlet. | | | |
| **Electrical Requirements** | | | | |
| Input | 120V model: 1ph-60 Hz | 230V model: 1ph-60 Hz | 230V model: 1ph-50 Hz | |
| Input power connections | 2 power connections, each model | | | |
| Full Load Amps | 120V model: 2.0A | 230V model: 1.0A | | |
| Power consumption, nominal, watts | 180 | 190 | 190 | 190 |
| **Dimensions, inches (mm)** | | | | |
| Height – unit only | 14 (355) not including pipe connections | | | |
| Height – including hard pipe connections | 18-5/8 (473) | | | |
| Height – including one-shot connections | 19-5/8 (498) | | | |
| Width | 22-7/8 (581) | | | |
| Depth – Top | 39-1/2 (1003) | | | |
| Depth – Bottom | 29-5/8 (752) | | | |
| **Weight, lb (kg)** | | | | |
| Unit only | 77 (35) | | | |
| Shipping weight | 125 (57) | | | |
| Installed, with refrigerant | 79 (36) | | | |
| **Number of fans** | 2 | 2 | 2 | 2 |
| **Airflow, Nominal, $ft^3$/ min ($m^3$/ hr)** | 1000 (1699) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet | | 833 (1415) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet | |
| **Audible noise** | 78 dBa sound power | | 73 dBa sound power | |
| **Pipe Connections (without Liebert Flex Pipe)** | | | | |
| Refrigerant supply from Liebert XDP/ XDC | 1/2" OD, Cu, (optional 1/2" threaded coupler flex piping) | | | |
| Refrigerant return to Liebert XDP/ XDC | 5/8" OD, Cu, (optional 3/4" threaded coupler flex piping) | | | |
| **Serviceable Parts** | Fans and electrical components | | | |
| **Cabinet Exterior Finish** | Black, matte finish, heat-fused powder coat | | | |
| **Options** | | | | |
| Condensate sensing (factory-installed) | Dry contact outgoing signal | | | |
| Pre-Charged Refrigerant | R-134a Refrigerant, one-shot connections | | | |
| **Agency** | | | | |
| Approvals | CSA 60Hz | | CSA 50Hz | CE 50Hz |

* = Revision level of unit

**Table 38 Liebert XDV8 dimensions—domestic and export**

| Model | Shipping Dimensions Length x Width x Height inches (mm) | | Unit Dimensions Unpacked Length x Width x Height inches (mm) |
|---|---|---|---|
| | Domestic | Export | Unit Only |
| All Models | 48 x 40 x 24-1/4 (1219 x 1016 x 616) | 45-4/5 x 30-3/4 x 33 (1163 x 781 x 839mm) | 39-1/2 x 22-7/8 x 14 (1003 x 581 x 356) |

**Table 39 Liebert XDV10 dimensions—domestic and export**

| Model | Shipping Dimensions Length x Width x Height inches (mm) | | Unit Dimensions Unpacked Length x Width x Height inches (mm) |
|---|---|---|---|
| | Domestic | Export | Unit Only |
| All Models | 48 x 40 x 24-1/4 (1219 x 1016 x 616) | 45-4/5 x 30-3/4 x 33 (1163 x 781 x 839mm) | 39-1/2 x 22-7/8 x 14 (1003 x 581 x 356) |

**Table 40 Liebert XDCF specifications**

| **Models** | **XD-CF-10-TP-0, XD-CF-10-TPE-0 XD-CF Top EXP, XD-CF-10-BPE-0 XD-CF BTM EXP, XD-CF-10-BP-0** |
|---|---|
| **Cooling capacity, maximum** | 10kWH / 2.8 Tons / 34,000 BTUh |
| **Conditions** | 55°F (13°C) entering fluid temperature, 50°F (10°C) or lower dew point |
| **Dimensions, inches (mm)** | |
| Height – including pipe connections | 31-3/8" (797mm) |
| Width | 13-7/16" (341mm) |
| Depth | 7-5/16" (186mm) |
| **Weight, lb (kg)** | |
| Unit only | 18 (8.2) |
| Shipping weight | 30 lb. (13.06 kg) |
| **Pipe connections** | |
| Refrigerant Supply from Liebert XDP/Liebert XDC | 1/2" threaded one-shot coupling on the unit |
| Refrigerant Return to Liebert XDP/Liebert XDC | 5/8" threaded one-shot coupling on the unit |
| **Cabinet exterior finish** | Gray |
| **Agency** | |
| Safety | CSA — CE |

**Table 41 Liebert XDH specifications**

| **Models** | **XDH20DKP-0<br>XDH20DK--0<br>XDH20BKP-0<br>XDH20BK--0<br>XDH20DKPE0<br>XDH20DK-E0<br>XDH20BKPE0<br>XDH20BK-E0<br>(60Hz)** | **XDH32DKP-0<br>XDH32DK--0<br>XDH32BKP-0<br>XDH32BK--0<br>XDH32DKPE0<br>XDH32DK-E0<br>XDH32BKPE0<br>XDH32BK-E0<br>(60Hz)** | **XDH20DSP-0<br>XDH20DS--0<br>XDH20BSP-0<br>XDH20BS--0<br>XDH20DSPE0<br>XDH20DS-E0<br>XDH20BSPE0<br>XDH20BS-E0<br>(50/60Hz)** | **XDH32DSP-0<br>XDH32DS--0<br>XDH32BSP-0<br>XDH32BS--0<br>XDH32DSPE0<br>XDH32DS-E0<br>XDH32BSPE0<br>XDH32BS-E0<br>(50/60Hz)** |
|---|---|---|---|---|
| **Cooling Capacity** | **XDH20**, 60Hz Nominal (98ºF [37°C] EAT): 22kW/6.3 Tons<br>**XDH20**, 60Hz Maximum (105ºF [40°C] EAT): 25.5kW/7.3 Tons<br>**XDH20**, 50Hz Nominal (98ºF [37°C] EAT): 19kW / 5.4 Tons<br>**XDH20**, 50Hz Maximum (116ºF [47°C] EAT): 25.5kW/7.3 Tons<br>**XDH32**, 60Hz Nominal (98ºF [37°C] EAT): 30kW/8.5 Tons<br>**XDH32**, 60Hz Maximum (105ºF [40°C] EAT): 34.5kW/7.3 Tons<br>**XDH32**, 50Hz Nominal (98ºF [37°C] EAT): 27kW / 7.7 Tons<br>**XDH32**, 50Hz Maximum (108ºF [42°C] EAT): 34.5kW/7.3 Tons | | | |
| **Conditions** | Capacity rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point | | | |
| **Electrical Requirements** | | | | |
| Input | 120V-1ph-60Hz | | 220-240V-1ph-50Hz, CE /<br>208-240V-1ph-60Hz, CSA | |
| Input Power Connections | Two IEC320-C14 power inlets and two IEC power cords with NEMA 5-15P connectors | | Two IEC320-C14 power inlets and two IEC power cords with IEC320-C14 receptacles | |
| Full Load Amps | 5 | 10 | 2.5 | 5 |
| Power Consumption, Nominal, Watts | 600 | 1200 | 575 | 1150 |
| **Dimensions, inches (mm)** | | | | |
| Height—Unit Only | 78 (1981) | | | |
| Height—Including Pipe Connections | 80 (2032) | | | |
| Width | 12 (305) | | | |
| Depth | 42 (1067) | | | |
| **Weight, lb (kg)** | | | | |
| Unit Only | 233 (106) | 246 (112) | 233 (106) | 246 (112) |
| Shipping Weight | 317 (144) | 330 (150) | 317 (144) | 330 (150) |
| **Number of Fans** | 6 | | | |
| **Airflow, Nominal, $ft^3$/min ($m^3$/hr)** | 2500 (4248) | 4000 (6796) | 2428 (4125) | 3850 (6541) |
| **Audible Noise, Sound Power** | 81 dBa | 86 dBa | 81 dBa | 86 dBa |
| **Pipe Connections** | | | | |
| Refrigerant Supply | 1/2" OD, Cu (optional 1/2" threaded one-shot coupling on the unit) | | | |
| Refrigerant Return | 7/8" OD, Cu (optional 7/8" threaded one-shot coupling on the unit) | | | |
| **Serviceable Parts** | Fans and electrical components | | | |
| **Cabinet Exterior Finish** | Black, matte finish, heat-fused powder coat | | | |
| **Options** | Condensate Sensing (factory-installed)<br>Dry contact outgoing signal (24VAC - 1A maximum) | | | |
| | One-shot style flex pipe connections | | | |
| | Uni-directional or bi-directional air diffusers | | | |
| **Agency** | | | | |
| Approvals | CSA 60Hz | | CE 50Hz, CSA 50/60Hz | |

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